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V. 62 / 11
VOL. 3

UNITED STATES NAVAL MEDICAL BULLETIN

FOR THE
INFORMATION OF THE MEDICAL
DEPARTMENT OF THE SERVICE



LIMITED TO PROFESSIONAL MATTERS AS OBSERVED BY MEDICAL
OFFICERS AT STATIONS AND ON BOARD SHIPS IN EVERY
PART OF THE WORLD, AND PERTAINING TO THE PHYS-
ICAL WELFARE OF THE NAVAL PERSONNEL

JANUARY, 1909

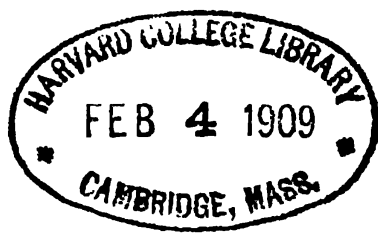
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NAVY DEPARTMENT,
Washington, March 20, 1907.

This United States Naval Medical Bulletin is published by direction of the Department for the timely information of the Medical and Hospital Corps of the Navy.

TRUMAN H. NEWBERRY,
Acting Secretary.

(III)

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PREFACE.

The publication and issue of a quarterly bulletin by the Bureau of Medicine and Surgery contemplates the timely distribution of such information as is deemed of value to the medical officers and the hospital corps in the performance of their duties, and with the ultimate object that both shall continue to advance in proficiency in respect to all of their responsibilities.

It is proposed that the Naval Medical Bulletin shall embody matters relating to hygiene, tropical and preventive medicine, pathology, laboratory suggestions, chemistry and pharmacy, advanced therapeutics, surgery, medical department organization for battle, and all other matters of more or less professional interest and importance under the conditions peculiar to the service and pertaining to the physical welfare of the naval personnel.

It is believed that the corps as a whole should profit, to the good of the service, out of the experience and observations of the individual. There are many excellent special reports and notes beyond the scope of my annual report being sent in from stations and ships, and by communicating the information they contain (either in their entirety or in part, as extracts) throughout the service, not only will they be employed to some purposes as merited, but all medical officers will thus be brought into closer professional intercourse and be offered a means to keep abreast of the times.

Special attention will be given by the instructors of the Naval Medical School to the review of advances in medical science of special professional interest to the service, as published in foreign and home journals, and extracts from these will appear in the bulletin, together with such remarks as the instructors may deem of value to officers on foreign service or sea duty.

Information received from all sources will be used, and the Bureau extends an invitation to medical officers to prepare and forward, with a view to publication, matter on subjects relating to the profession in any of its allied branches.

P. M. RIXEY,
Surgeon-General, U. S. Navy.

(VII)

SPECIAL ARTICLES.

THE ARTIFICIAL ILLUMINATION OF NAVAL VESSELS—A STUDY IN NAVAL HYGIENE.^a

By Medical Inspector J. D. GATEWOOD, U. S. Navy.

(Instructor in Naval Hygiene at the United States Naval Medical School, Washington, D. C.)

Steam has been utilized to effect remarkable changes in the condition of the contained air of ships. These changes have resulted not only from its use to directly control the temperature of the air of occupied spaces in cold weather, but also from the conversion of the mechanical energy of the engine into electricity by which blowers are run at high speed for the rapid renewal of air and the electric lamp is made available for artificial illumination. Thus, at the same time that ventilation and heating have been secured, vitiation of air by candles and oil lamps has been discontinued.

It seems noteworthy that by a single agent, with applications then unrecognized, so many apparently widely separated objections, important from a hygienic point of view and loudly proclaimed in the days of the sailing ship, have been removed. Yet, the agent itself has been the author of difficulties then equally unknown, as is evident from the large amount of uncontrolled or wild heat on many modern ships, the disagreeable drafts in cold weather incident to mechanical ventilation without heating the air supplied, and the damaging effect upon eyes of artificial light capable of meeting requirements but not adjusted. It, therefore, seems that the heating, ventilation, and lighting of ships properly continue to attract the attention of the naval sanitarian.

There are two generally recognized systems of illumination, the direct and the indirect. In complete indirect or cove lighting the total light is reflected upon surroundings, such as the ceiling and upper parts of walls, and thence to the lower portion of the room. Thus, the concentration of direct light at the lamp is received by a reflector that, placed below, conceals the filament or light source, is diffused by

^a Thesis prepared for the Naval Examining and Naval Medical Examining Boards.

being thrown upon the large surface of the upper part of the room, and still further scattered by reflection to the lower parts of the room. In complete direct lighting, opaque shades are placed above the lamps and the total light reflected at once downward. In very many cases, or ordinarily, both systems are combined in varying degrees, but where the element of indirect lighting predominates the light is diffused, no bright points come into the field of vision, and there are no disconcerting shadows.

An indirect artificial light causes insufficient illumination for reading, unless the candlepower of the lamp is about 65 per cent greater than that of a direct light giving adequate illumination for that purpose, as, even with ceiling and walls of the best color for reflection, a large percentage is lost by absorption. Such a system is very suitable for the general illumination of a hospital ward, the lamps being inside of whitened spun glass bowls on fixtures from ceiling and along midline of ward. The bowls should be covered with a thin sheet of plain glass to keep out dust. However, there is so much loss of light at ceiling and walls that sockets between beds are necessary for individual lamps to be used as required for examination of patients.

On a ship an indirect system of lighting is impracticable for a number of reasons, including not only the great loss of illumination for power expended, but also the absence, in any space where there is reading or clerical work, of the somewhat increased illumination on the page over that of surrounding objects which experience has demonstrated to be advisable for comfort. On the other hand, in direct lighting the opaque shade is highly objectionable, as it floods the page with light, often with too much light, and leaves most of the room in such comparative darkness that the eye, looking up from a brilliant surface, and, therefore, with small pupil, is in much the same situation as if the individual had come suddenly into a dark room from a brilliantly illuminated one. This is reversed when work is resumed, as then the eyes suffer for a time from the access of too much light through a dilated pupil. Thus opaque shades cause marked iris accommodations and repeated shocks that are opposed to the continuance of good sight. These shocks are so frequent and damaging that they are sufficient to condemn any system causing them.

Those considerations, and many others, lead to the conclusion that while the artificial illumination of ships must be in some part by the direct system, the method employed should combine both systems, as it should include means of obtaining, in addition to direct light, sufficient general illumination by diffused light. This can be accomplished through shades or globes constructed to hide the filament and yet to permit the passage of light softened to abolish glare.

Such shades, in the interest of efficiency and economy, can only be constructed of prismatic glass and should really be diffusing prismatic reflectors. As constructed on the Holophane system they give as wide diffusion as opal with very much less loss of light by absorption, only about 12 per cent in comparison with the 10 per cent of plain glass and the 60 to 70 per cent of the opal globe, and are made in many different forms to meet varying requirements, appearing as globes or modified globes, chiefly for general illumination, and as shades or reflectors for general illumination combined with the direct light required for desk work.

If this general conclusion be granted, the question is reduced to a study of how to use on ships to the best advantage the prismatic system of shades in connection with electric lamps. In that study it is primarily necessary to know the properties and qualities of lamps and fixtures.

In that connection it is certainly not necessary to show that the intensity of light varies inversely as the square of the distance from the source of light; but the method of proof of that well-known proposition is short and grades into the discussion in such an important way that the following diagram is submitted to preserve continuity:

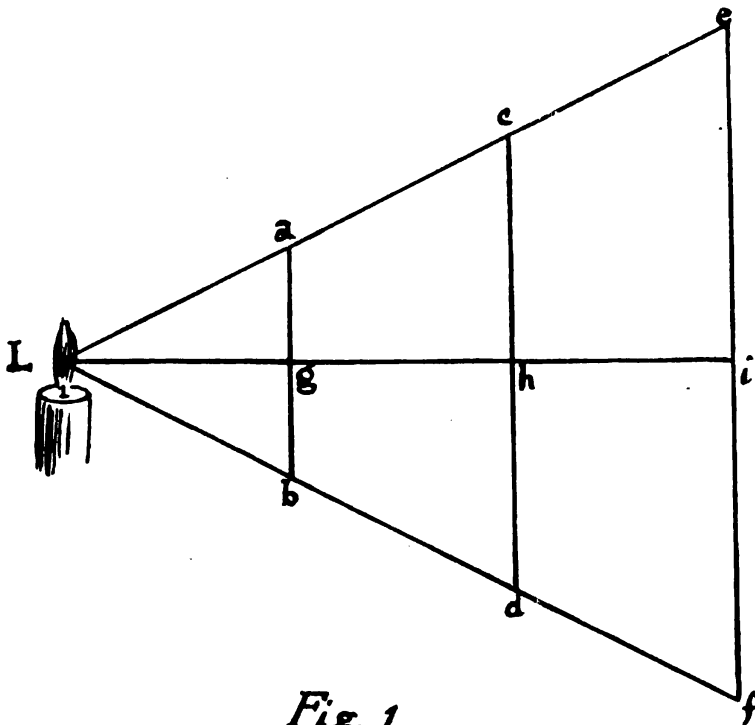


Fig. 1.

If "L" is the light and "ab" represents the side of a square at a distance of 1 foot, the square "ab" receives the same number of rays as the square of which "cd" is the side. But if the square represented

by "cd" is 2 feet away or twice the distance of "ab," its side is twice the length, and therefore the area four times as great. Then as the same number of rays fall on a surface four times as large, the intensity must be just one-fourth, or the inversion of the square of the distance. In the same way the square represented by "ef," if 3 feet away from the light, is illuminated with only one-ninth the intensity of the square "ab" only 1 foot away or one-third the distance.

Now, if the light "L" is from a standard candle, that is a sperm candle burning 120 grains an hour, it is said to have an intensity of one candlepower, or to be a 1 candlepower light. Such a candle contains 80 per cent carbon, 13 per cent hydrogen, and 6 per cent oxygen. This is known as the British candle and is not a very satisfactory standard, as it may have values differing by 5 per cent or more. It is, however, the general unit of luminous intensity in the United States, but in the photometry of electric lamps it is common to take the Hefner lamp as the primary standard and to express the result in British candles, using the ratio: 1 Hefner=0.88 British candle.

The illumination, or the amount of light on a surface, is expressed as foot candles. For instance, in the illustration employed to show that intensity varies inversely as the square of the distance, the illumination of the point "g," the midpoint of its square, is 1 foot candle, as it is 1 foot distant from a standard candle or 1 candlepower light. If it were a 16 candlepower light at "L," the illumination at 1 foot would be 16 foot candles; at 2 feet, 4 foot candles; and at 4 feet, 1 foot candle, as the intensity varies inversely as the square of the distance.

Then, if the light "L" be assumed to be a point emitting rays equally in all directions, the foot candles can be readily calculated for any point above or below the horizontal plane "Li" and on a surface normal to the ray in that direction, all the data required being candlepower and distance from the light. But lights, such for instance as electric lamps, do not furnish light of the same power in all directions, and therefore to calculate the foot candles it is necessary to know the particular candlepower in the direction of the point where the foot candles are to be determined. In other words, it is necessary to have a distribution curve of the lamp in order to calculate foot candles on every surface illuminated by it, the distribution curve of a lamp being the curve showing its candlepower at every angle.

In explanation of the origin of such a curve it should be considered that if a light emitting rays equally in all directions is at the center of a hollow globe, the interior surface of the globe will be equally illuminated. In other words, the distribution curve in any given plane will be a circle. Then the distribution curves of a num-

ber of such lights, varying only in candlepower, would be represented by an equal number of concentric circles arranged in order of candlepower, the smallest circle corresponding to the light of smallest candlepower, and the difference in the lengths of the radii corresponding to the difference in candlepowers. This is shown in the following diagram, in which the circles are distribution curves of different lights emitting rays equally in all directions and varying in regular progression by one candlepower:

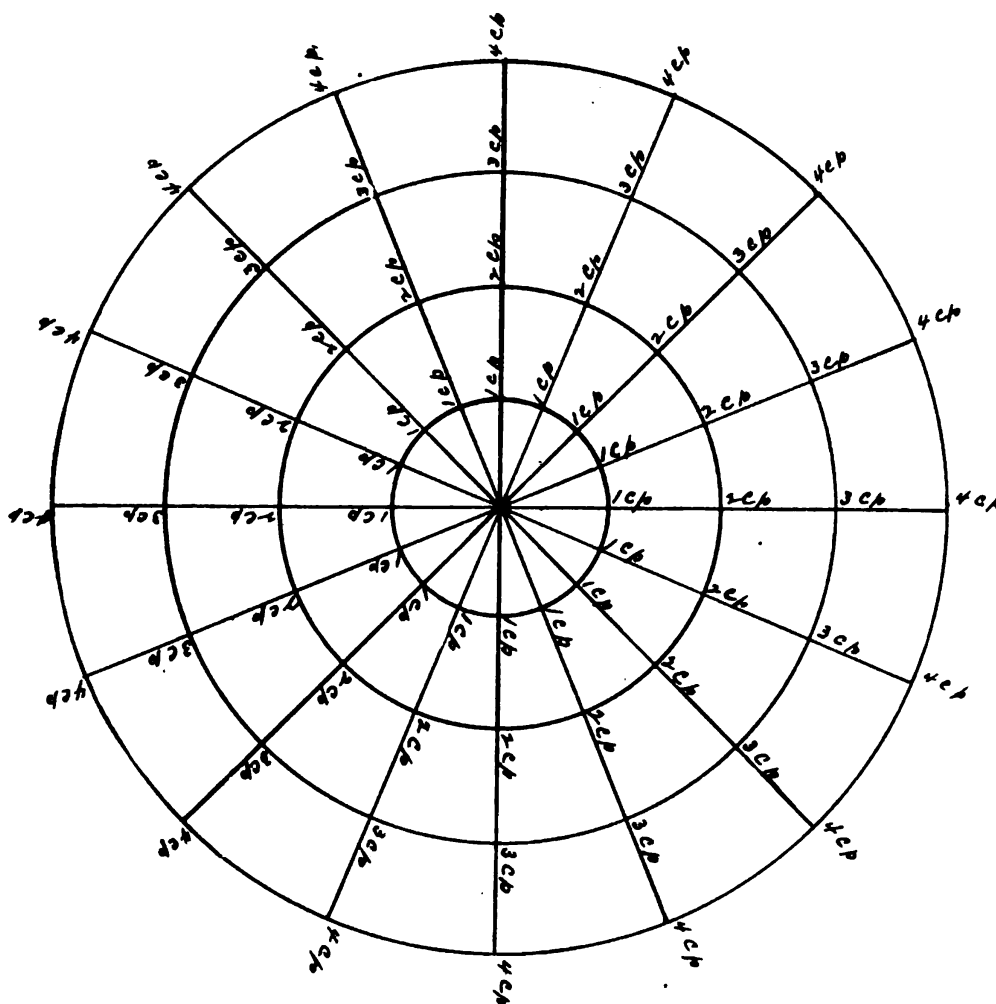


Fig. 2

From an examination of this diagram it becomes evident that if a lamp is not emitting rays equally, but has a different candlepower for each direction, its distribution curve in any plane will not be a circle but a curved line joining the ends of right lines proceeding from the lamp at every angle and having lengths in proportion to

candlepower. For instance, the following diagram may be considered as an example of the distribution curve in a vertical plane of some bare filament lamp placed vertically, the candlepower for the varying angles in that plane having been determined by photometer:

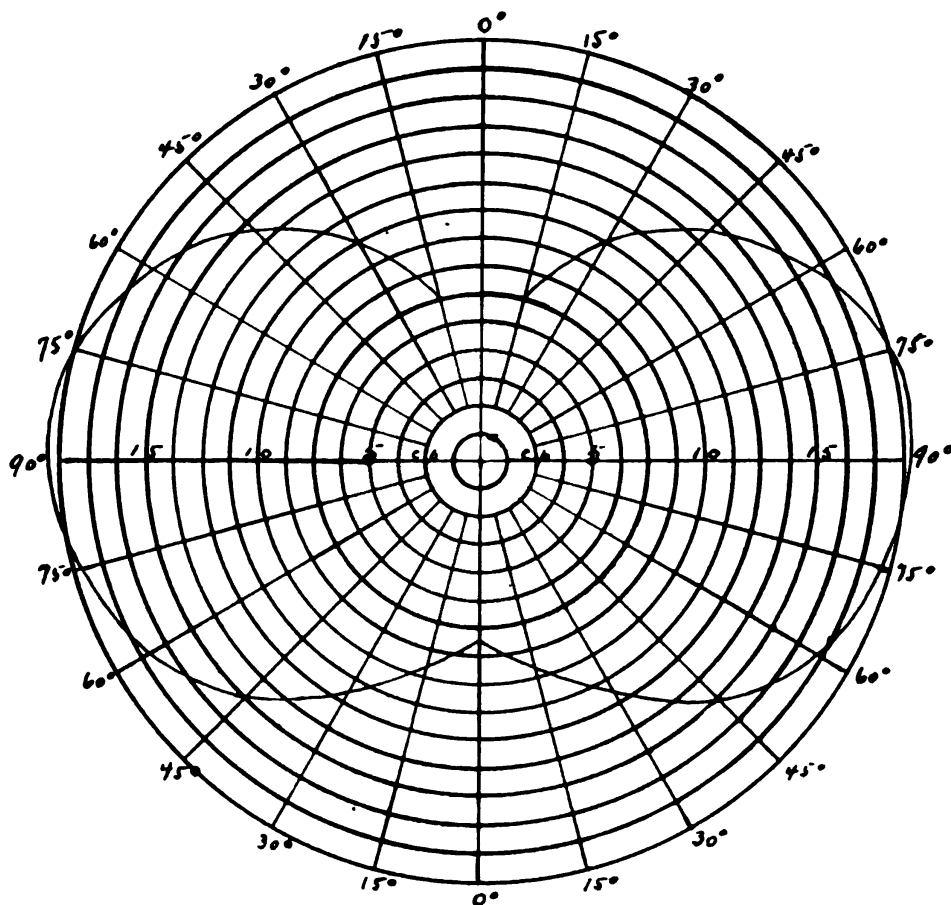


Fig. 3

It will be noted that the curve is plotted in connection with concentric circles, each one of which would be the distribution curve of a light emitting rays equally and having the indicated candlepower.

From the diagram it appears that the horizontal candlepower is about 19, while the vertical candlepower, or that in a direction immediately under the light, is less than 9, and at an angle of 45 degrees from the vertical about 15. Suppose then, as illustrated in the following diagram, it were desired to calculate the foot candles at a point "P" in the plane "ts," 8 feet below a lamp having the distribu-

tion curve given in fig. 3, and 8 feet from the foot of the perpendicular through the lamp:

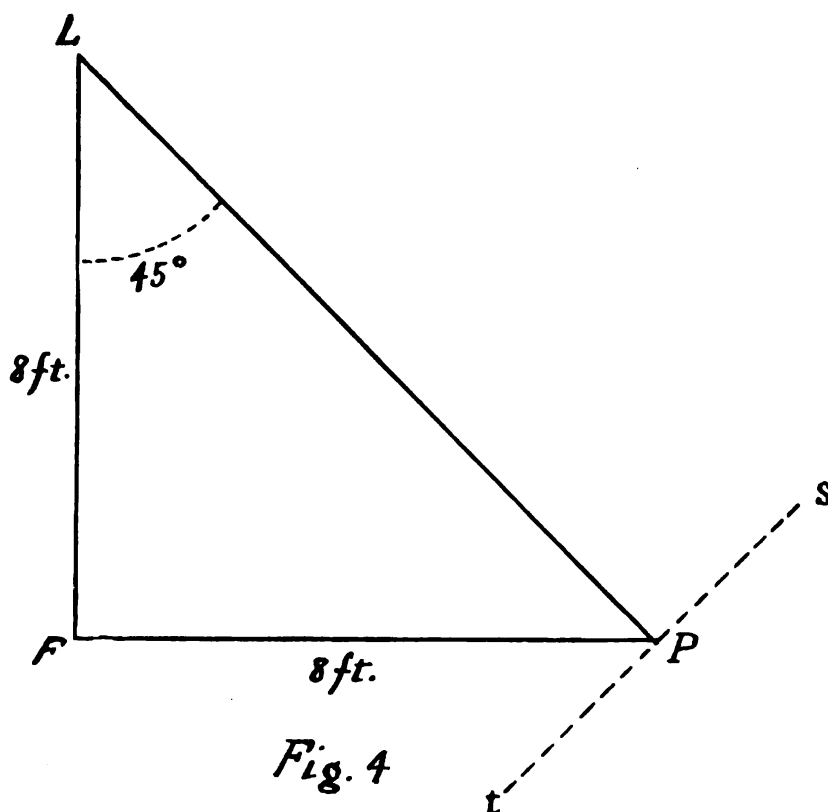


Fig. 4

The distance of the point "P" from the lamp "L" is the hypotenuse of a triangle of which the vertical side is the distance under the lamp and horizontal side the distance from the foot of the vertical. As the length of an hypotenuse is equal to the square root of the sum of the squares of the other two sides, the distance from the light "L" of the point "P" is equal to the square root of 128. As the angle at "L" is necessarily 45 degrees and, as shown by the distribution curve given in fig. 3, the candlepower of the lamp in that direction is 15, the foot candles at "P," representing the normal surface "ts" in that locality, will be equal to 15 divided by the square of the distance "PL" or $\frac{15}{128} = 0.117$. Thus, in all such calculations, it is necessary to have the distribution curve of the lamp as it has been determined by photometric observations and, having deduced the distance from the light of the point to be illuminated and the value of the angle at "L," to pick out from the curve the candlepower corresponding to that angle and divide it by the square of the distance, which in all cases is the sum of the squares of the other two sides of the right-angled triangle.

But it is essential to appreciate that the foot candles thus obtained are the illumination of a point representative of a locality on a plane

normal to the ray or perpendicular to its direction, as is indicated by the dotted line "ts" in the diagram just given, and that all points, except "F," in any horizontal plane under the lamp, such as the surface represented by "FP" in the diagram, are losing available light by reflection, such reflected light finding the walls or other surfaces of a room and not being available for the illumination of the horizontal surface as appreciated by the eye, except to the small extent in which it may happen to again find the surface at the proper angle after repeated reflections and losses by absorption. Consequently, the available foot candles can not be calculated, for any part of a horizontal surface, in the manner indicated, except for that locality directly under the lamp, without using a reduction factor which will vary with each angle of incidence, or the angle the ray makes with the perpendicular to the surface upon which it falls. The smaller the angle "FPL" the greater is the percentage reduction, as the greater is the relative amount of light reflected, and the larger that angle the less is the percentage reduction until, when the angle is 90° or the point is directly under the light, the reduction becomes zero.

This may be made more clear by the following diagram in which "L" is the point of light of one candlepower emitting rays equally in all directions and "P" is the part of a horizontal plane illuminated by it:

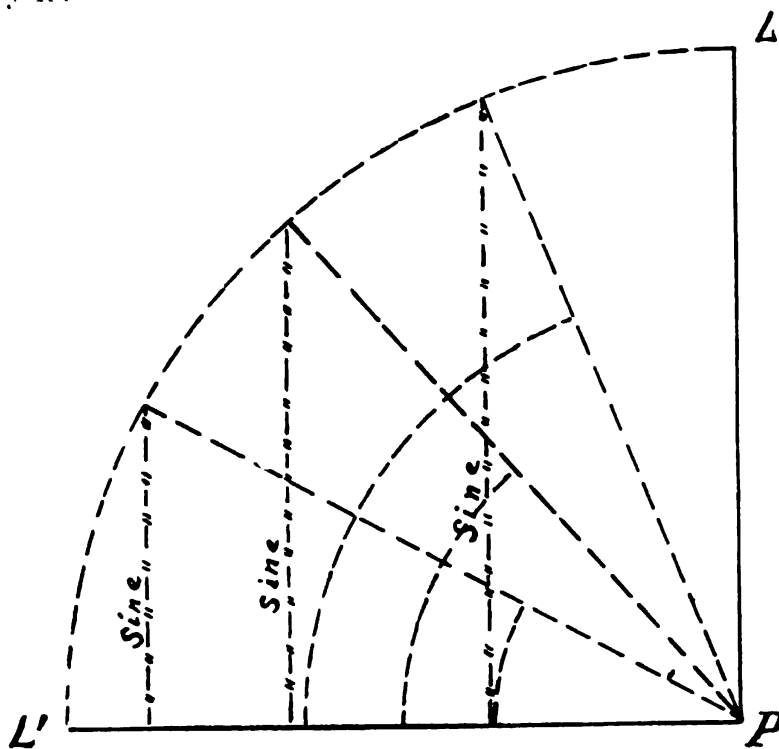
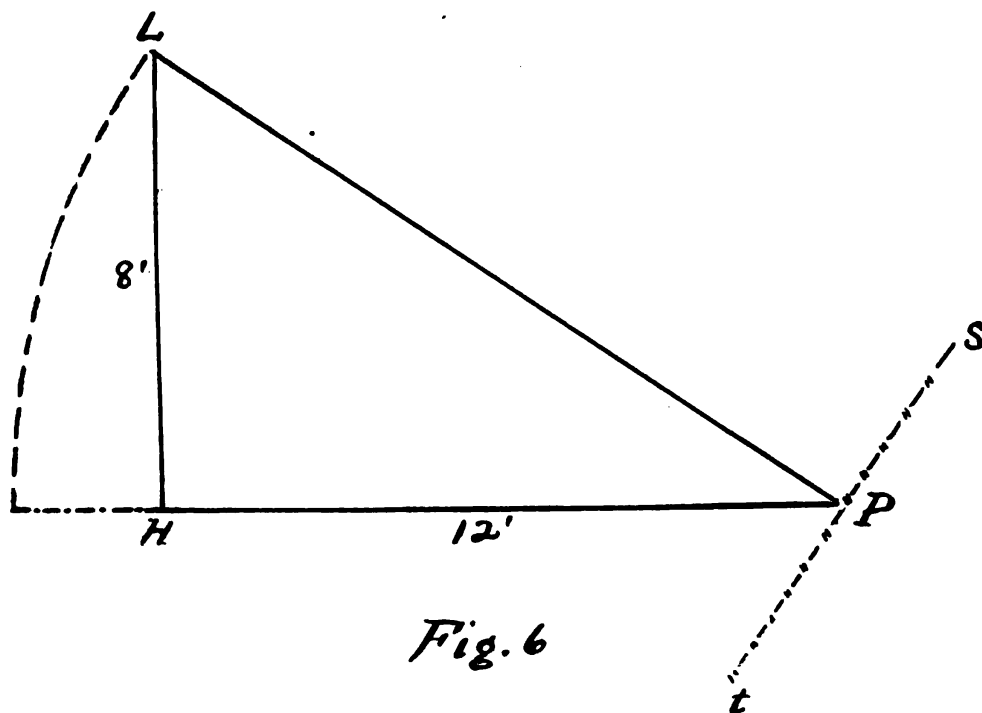


Fig. 5

It is obvious that if "L" be moved about "P," with "PL" as a radius, it will remain at the same distance from "P" during the

revolution. But as "L" the light moves on the circumference toward "L¹," the loss in foot candles at "P" increases as the sine of the angle of obliquity diminishes, the angle of obliquity being the angle the ray makes with the horizontal (L'P), and the foot candles at "P" under an oblique ray will be to the foot candles under the vertical ray as the sine of the angle of obliquity is to the distance from the light, or the radius.

For instance, suppose, as in the following diagram, it is desired to find the foot candles on a horizontal plane "HP" at a point "P," 8 feet below a 1 candlepower light "L" and 12 feet from the point "H" directly under the lamp:



The distance, "PL," from the light is equal to $\sqrt{64+144}=14.42$ feet, and the foot candles on "P," as part of the plane "ts" normal to the ray, are $\frac{1}{(14.42)^2}=0.0048$. But 8 feet is the length of the sine "HL" of the angle of obliquity "HPL" and that sine is $\frac{800}{14.42}=55.48$ per cent of the radius "PL," or the distance from the light. Therefore, the foot candles on the horizontal plane "HP," at the point "P" from a single candlepower at "L," will be $0.0048 \text{ by } .5548 = 0.00266$.

Returning to the type-distribution curve of a bare electric lamp, fig. 3, and to fig. 4, with the calculation showing that, at a point 8 feet below that lamp and 8 feet from the foot of the perpendicular through the lamp, the foot candles on a plane normal to the ray would be 0.117, it is now obvious that on a horizontal plane at that point

the effective foot candles would be 0.117 by $\frac{8}{\sqrt{128}} = 0.0828$, or, the vertical distance below the lamp being about 70.73 per cent of the actual distance from the lamp, 70.73 per cent of 0.117 is 0.0828.

In this work it has become obvious that, to use the distribution curve of any lamp it is essential to have the angle at the lamp—i. e., the angle that the hypotenuse of the triangle, which is the line of distance, makes with the vertical from the lamp to the horizontal plane. In the absence of a table of sines this angle at "L" may be derived approximately, though perhaps with sufficient accuracy for ordinary purposes, directly from the parts of the triangle itself by using the following formula in which "A" is the required angle at the light, "h" the hypotenuse, "v" the vertical or altitude, and "b"

the base or horizontal distance from the light: $A = \frac{90\sqrt{h-v}}{\sqrt{h-v} + \sqrt{h-b}}$.

For convenience in making calculations of foot candles on ships, in order that lamps may be so placed over desks and tables as to secure the number of foot candles accepted as standard, the following table has been prepared, the calculations of the angle A at the light having been made from $\text{Sine } A = \frac{b}{h}$ and of foot candles in the manner indicated, assuming for a unit, or the most convenient working basis, a light of one candlepower emitting rays equally in all directions and illuminating horizontal planes upon which it is desired to know the foot candles at points within ship's spaces at ordinary distances below the light and ordinary horizontal distances from the light:

Table of effective illumination in foot candles at varying points on horizontal planes below a 1-candlepower light, and of corresponding angles at the light.

Height of light (feet) above horizontal plane.	Horizontal distance (feet) from point for which foot candles are to be calculated to foot of perpendicular from light.															
	0.		2.		3.		4.		5.		6.		7.		8.	
	Angle.	Foot candles.	Angle.	Foot candles.	Angle.	Foot candles.	Angle.	Foot candles.	Angle.	Foot candles.	Angle.	Foot candles.	Angle.	Foot candles.	Angle.	Foot candles.
2	0	0.25000 45	0	0.08830 56.3	0	0.04265 63.4	0	0.02240 68.2	0	0.01280 71.6	0	0.00790 74.1	0	0.00518 76.0	0	0.00355
3	0	.11111 33.6	.06397 45	.03927 53	.02400 59	.01513 63.4	.00993 66.8	.00679 69.4	.00480							
4	0	.06250 26.6	.04470 36.8	.03200 45	.02206 51.3	.01523 56.3	.01064 60.2	.00763 63.4	.00560							
5	0	.04000 21.8	.03198 31	.02522 38.6	.01904 45	.01414 50.2	.01049 54.5	.00785 58	.00595							
6	0	.02775 18.4	.02365 26.6	.01987 33.6	.01600 39.8	.01259 45	.00980 49.4	.00764 53.1	.00602							
7	0	.02041 16	.01814 23.2	.01584 29.7	.01335 35.6	.01090 40.7	.00893 45	.00708 48.8	.00582							
8	0	.01563 14	.01428 20.6	.01282 26.6	.01119 32	.00952 36.8	.00801 41.1	.00665 45	.00552							
9	0	.01235 12.5	.01147 18.4	.01054 24	.00940 29.1	.00824 33.6	.00711 37.9	.00607 41.7	.00515							

To illustrate the method of using this table, the type distribution curve of a bare filament lamp as given in fig. 3, may be again util-

ized. Suppose in connection with such a bare lamp it is desired to know the foot candles at a point on a desk 7 feet below the light and 3 feet from where the perpendicular from the lamp meets the horizontal plane of the desk:

From the table it appears that the corresponding angle at the light is 23.2 degrees, and from inspection of the distribution curve, fig. 3, it is evident that the candlepower of the lamp in that direction is about 10.42. Now, as it appears from the table that one candlepower would give 0.01584 foot candles at the point designated, it is evident that 10.42 candles would furnish 0.01584 by $10.42 = 0.165$ foot candles.

Having proceeded thus far, it is now in order to consider the manner in which globes or shades modify the distribution curves of bare lamps. It should be noted, however, that it is the distribution curve that is modified and not the method of calculating foot candles. Whatever the distribution curve, the method of utilizing it in the calculation of foot candles remains the same as that given. But, when a globe or shade is used in connection with a lamp it is not the distribution curve of the bare lamp that is so utilized; on the contrary it is necessarily the distribution curve of the lamp and globe or shade—the distribution curve of the bare lamp as modified by its globe or shade.

If one inspects the distribution curve of the bare lamp given in fig. 3, it becomes apparent that a very large percentage of the light is in and above the horizontal plane through the lamp and is therefore lost for the direct illumination of any surface below. Such light goes to walls and ceiling where a varying percentage is absorbed, chiefly in accordance with their color, and, therefore, entirely lost, and the remainder is reflected into the room to add to the general illumination given directly by the lamp. While the effective general illumination of a room depends very greatly upon the color of the room and of all objects within it, and this is a factor of prime importance in limiting iris accommodations and retinal shocks in any room where there is near work, it is very uneconomical and otherwise undesirable to depend upon such reflected light to make up required desk illumination, as not only must much higher candlepower be employed, but also, with an exposed light, the eyes are subjected to the more or less dazzling glare found whenever there are no means of softening direct rays. It is quite evident that a bare electric lamp should have no place in the illumination of any occupied space on a ship, but in all cases reflectors should be employed to greatly diminish loss by bringing down light that is in or above the horizontal plane through lamps placed above and, in addition, according to object, either globes should be used or shades, constructed to permit the passage of the largest percentage of light with the requisite degree of softening or diffusion. It should be the object to secure at

all times a very good general illumination that for near work should be, for reasons already given, not much less than the illumination of the desk itself. This is so important that in a stateroom or office of a ship a single light, even with prismatic reflector, should not be depended upon to secure the degree of general illumination required in addition to the foot candles necessary on the desk but in all such rooms there should be a lamp within prismatic globe placed solely for general illumination and another lamp in connection with a diffusive prismatic reflector placed above the desk to secure by direct light the foot candles required for near work and to add, by its diffusive shade, to the general illumination that is so important.

In changing the direction of rays, in and above the horizontal plane through the bare lamp, a reflector necessarily modifies distribution curves and in softening and diffusing the light that passes through prismatic glass makes further changes. The comparison of the distribution curve of the bare lamp with the distribution curves of the same lamp in connection with various prismatic globes and shades is important in the selection of standard fixtures for a suitable system of lighting, but as prismatic glass should be employed in all quarters the distribution curve of the bare lamp would be valueless in the calculations incident to the proper installation of such fixtures. But given the standard fixture with its distribution curve and the standard foot candles required at any point, the position of the one can, by the method given, be readily determined to secure the other. And much of this contention is that there should be just such standards and that each lamp, whether in a stateroom or office or over a mess table, should be placed in accordance with a system evolved to secure a recognized standard of illumination.

The following is an illustration of a Tungsten lamp with one variety of a bowl Holophane reflector and below it is the distribution curve of such a lamp and reflector in a vertical plane:



Fig. 7

The "Gem Metallized," the "Tantalum," and the "Tungsten" are all filament lamps. They are the generally recognized examples of high efficiency or low watt incandescent lamps. The "Tungsten" lamps are put on the market in two sizes and are rated by total wattage as 40 and 60 watts. They are operated at a stated efficiency of 1.25 watts per candle. As the distribution curve given is that of the 60-watt lamp, it is that of a 48-candlepower lamp as modified by the Holophane clear bowl reflector indicated. It may be noted here that this 48-candlepower lamp is of such high efficiency that, operating at 1.25 watts per candle, it is as economical in expenditure of power as a carbon filament, such as is used on our ships, of less than 20 candlepower, a carbon lamp operating at best at 3.1 watts per candle. There is then more than 100 per cent increase of light on the same expenditure of coal.

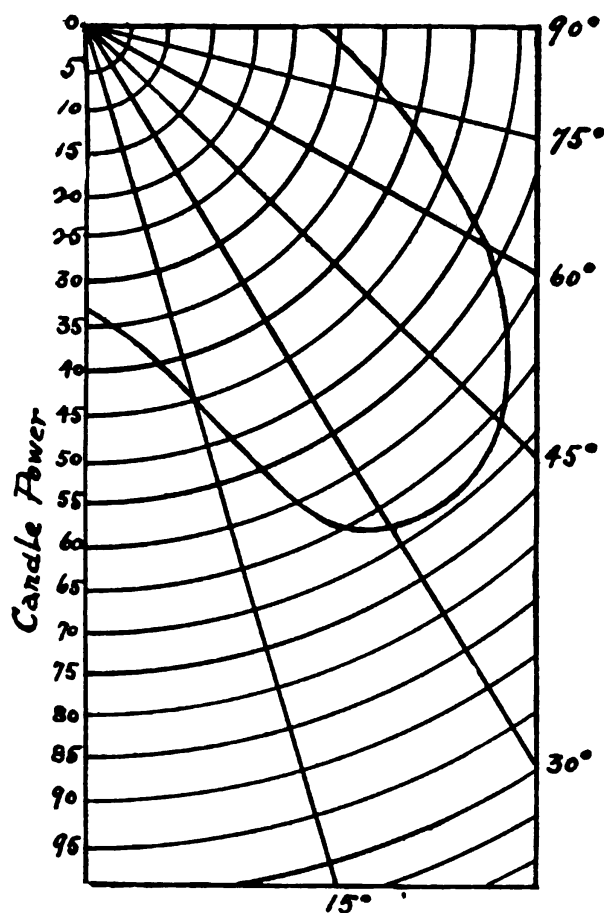


Fig. 8

It will be observed from the distribution curve just given that in a direction immediately downward the candlepower is about 34, and that the maximum candlepower, about 69, instead of being in the horizontal plane through the lamp, as in the case of a bare lamp, is

with an angle of about 36 degrees at the light. At 90 degrees the candlepower of the bare lamp would be about 48, but this prismatic shade brings the light fairly down and, unlike an opaque or even opal shade, allows a large percentage of light to pass for general illumination, diffusing it and at the same time hiding the filament as such. While this particular bowl reflector is probably not the very best of its type for desk work on ships, it is the bowl type that will best meet the requirements of our ships in that respect, and probably the plain bowl of prismatic glass.

Applying to this distribution curve the method previously employed, it can be demonstrated that at about 3 feet 4½ inches, immediately below such a fixture, the illumination is 3 foot-candles. For if "x" be the required distance immediately below such a fixture at which the illumination is to be 3 foot-candles then, as the candlepower in that direction is 34, $34_x = 3 \therefore x^2 = 11.33 \therefore x = 3.366$ feet.

x

But, in view of shadows on work, it is never advisable to have a lamp immediately overhead when using a desk and, therefore, in placing such a fixture over a desk, it is necessary to decide just where the perpendicular from the lamp should meet the desk and then locate the fixture at an elevation over that point which will give the foot-candles desired at the work. In the case of this fixture, suppose it is desired to have 3 foot-candles at any given point on the desk, the perpendicular from the lamp to meet the desk at a distance of 2 feet from that point and on a line making an angle of 45 degrees with the desk front as in the following diagram, in which "P" is the point to be illuminated and "V" is the point immediately under the lamp.

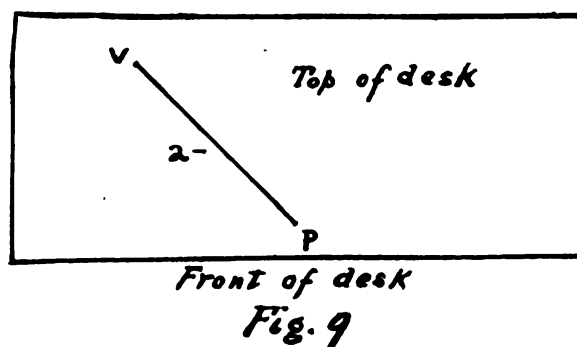


Fig. 9

From inspection of the distribution curve (fig. 8) it appears that at about an angle of 26.6 degrees the candlepower is 65. That angle corresponds to a height of 4 feet above the desk if the horizontal distance from the perpendicular is 2 feet, as will be seen by reference to the table given, where it also appears that the reduction factor is 0.0447. As $65 \text{ by } 0.0447 = 2.9$, the height of the center of the lamp above the desk should be almost exactly 4 feet to secure an illumina-

tion of 3 foot-candles at the point indicated. It is equally obvious that to secure such elevation as the above, or any elevation considered necessary to remove the fixture from the ordinary field of vision, sufficient candlepower is required to, at the same time, give the illumination at the selected point. With the 40 watt, or 32 candlepower Tungsten lamp, in the same position as above and with the same bowl reflector, the foot-candles at the same point would be about 2. And, when two or more lamps are in question, the effective illumination at a given point is the sum of the foot-candles at that point from each.

Such calculations are of much importance, as they are of great practical value and even on paper serve to emphasize the fact that it is not only practicable to have standards of illumination, but also to have standard fixtures, selected with reference to the hygienic requirements of different parts of the ship, which can be readily located to secure that illumination. In other words, the days of haphazard illumination of ships should be ended, as the subject can be and ought to be taken up in the careful and systematic way its importance deserves. Each part of a ship should be considered in accordance with demands upon the eyes in that locality, but under the important general condition that, in every occupied part of a ship, adequate general illumination, without glare, is essential. In addition to such general illumination, a lamp should be provided in each stateroom and office to give a standard desk illumination for near work. And there should be a standard maintained on mess and other tables around which persons gather. In all these cases a specified number of foot-candles should be secured by fixtures of known qualities knowingly located to accomplish the results required.

In the selection of fixtures there are not only essential general requirements, but also special requirements. For instance, all lights in living spaces should be so shaded and placed as not to present points of great brilliancy in the field of vision, at least without deliberate attempts to gaze at light source, and in near work the fixture or fixtures should not only give the required general illumination, as well as the foot-candles on the work, but also the location of the work should be evenly illuminated. This last consideration is of prime importance and yet, unfortunately, is not generally recognized at all. If the illuminated field, or the desk where the work is located, is not evenly illuminated, but has bands or streaks varying in foot-candles, the retina is rapidly shocked by light quickly varying in intensity as the eyes traverse the page. No iris is capable of responding with sufficient rapidity, and the rapidly repeated shocks are often worse than a general glare, as they commonly produce marked eye-strain with, ultimately, permanent defects. This situation is common on our ships as a result of the character of shade frequently

supplied with desk lamps. It is very apt to occur where a reflector having a polished interior white surface is used in connection with a lamp having a clear bulb.

The necessity, as measured by retinal fatigue or exhaustion, for removing the light source from the field of vision increases with its intensity expressed in candlepower per unit of its surface. An ordinary candle has about 3 candlepower per square inch of flame surface; a gas flame, perhaps, 5 or 6; a Welsbach mantle, about 20; an ordinary carbon filament, 400; a "Gem," 600; a "Tungsten," 1,000; and an open arc light, in its various parts, from 10,000 to 200,000. This relation of candlepower to area of light source is known as the intrinsic brilliancy and, in a filament light, is regarded as a measure of efficiency when considered in relation to power expended. An advantage of glow or vacuum lights, from a hygienic point of view, is the increased area of light source, or diminution of intrinsic brilliancy.

From the figures given it is obvious that with the introduction of electric lamps the necessity for taking the light source out of the field of vision became very greatly emphasized. This has become especially important in crew spaces in view of the large number of bulkhead or sidelights. It is lamentable that in the crew space of naval vessels the bare lamp is the rule, any additional glassware being plain and employed solely for the protection of the lamp. Frosted bulbs were issued originally in our service in considerable number, but the issue has been greatly reduced in view of the important fact that a frosted incandescent lamp falls to 80 per cent of its initial candlepower in about one-half the time taken by a corresponding plain bulb lamp, although the total life of the lamps is the same. This lowering of the efficiency of the frosted bulb makes its use very uneconomical and in other respects undesirable, as such lamps are more apt to be continued in use in fixed locations after the illumination has become insufficient. The initial intrinsic brilliancy of the frosted bulb is usually less than 5 candlepower per square inch in comparison with the 400 candlepower of the carbon filament. Its use at bulkheads removes the direct effect of the glowing filament and greatly diminishes the glare, but the total loss of light is always greater than in the case of clear prismatic glass, which softens light and conceals the filament without hastening the fall in initial candlepower. It is only by the introduction of prismatic glass that the illumination of crew spaces can be accomplished with satisfaction, as in that way the damage from bare filaments and uneven illumination can be avoided with the smallest loss of light. The eye does not resent an intrinsic brilliancy at or below 5 or 6 candlepower per square inch, but at present such sources

have 400 candlepower, and one such source is in plain view in about each 500 cubic feet of space. An exhausting picture of the filament is thus repeatedly formed on the retina, and the various objects about the space seem as relatively in a dim light. The result is a disadvantageous and harmful expenditure of light.

It ought to be recognized that there is very much difficulty in placing lamps advantageously in crew spaces, and that the location of a fixture is, perhaps, as important as the character of the fixture. The sun has an intrinsic brilliancy varying with angle of from 2,000 to 600,000, and it is fortunate that as its brilliancy increases it is farther from probable line of vision, and at all times as a single light source in a vast hemisphere is not in position to surprise the wandering eye. On a ship the deck overhead is cut up by beams, and occupied in no small degree by piping, mess tables, and other things. There are, however, a number of overhead lights in crew spaces, and the tendency should be to obtain as large a percentage of the illumination from that position as possible. In certain localities where that arrangement is practicable the fixtures should be selected to give the requisite foot-candles on mess tables that may be allowed below at certain hours for reading, writing, and games. For the space as a whole the difficulty or impossibility of placing a sufficient number of lamps overhead has led to the location of a number of lights on bulkheads where decided projections have to be avoided, because if a lamp is given much prominence in that position it is liable to be injured. Such lamps are therefore placed vertically to keep them out of the way, and in spring sockets, as are all the electric lamps of a ship, to take up concussion and ordinary vibrations. In addition, these bulkhead lamps are protected by elongated, more or less cylindrical, coverings of rather thick, plain glass. The fixture is completed by an outside metal cage, swung like a door to give access for cleaning and renewals.

To appreciate the disadvantages of a lamp so placed, from the point of view of its efficiency as a light source, the distribution curve of a bare lamp, fig. 3, may be again considered. It is evident from that curve that a bare lamp placed vertically gives maximum candlepower in a horizontal plane through its center. It therefore follows that a lamp placed with its long axis close to and parallel with a surface such as a bulkhead or a deck overhead is in the position to lose the largest percentage of efficiency from absorption of the light emitted, as it is then that the largest amount of light goes at once to a surface not calculated to act as a reflector. The light that is reflected has also much difficulty in reaching the space, as it has to pass back, through perhaps four thicknesses of glass, and a part is again and again reflected with loss. It has been very common on

ships to find lamps so placed, even overhead, where they have been provided with flattened hemispherical globes to give them less prominence and to lessen chance of injury by contact.

The number of lamps on naval vessels has rapidly increased and still there is a cry for more light. It is claimed that that cry will continue under present methods and that as more light is supplied the number of damaged eyes will increase. At first there was one 16-candlepower lamp to about each 1,000 cubic feet in crew spaces. The tendency now is to place one such lamp in each 500 cubic feet. This, while increasing general illumination, has added greatly to the difficulties of the eyes in relation to bare filaments and uneven reflections. The results would be more apparent, even in statistics, but for the routine life of a ship under which a man is either in his hammock early or on watch and the general illumination about the deck reduced to a minimum.

It has been shown that to greatly limit the difficulties, the first essential is to soften the light and remove filaments from view, and that this can be best accomplished by the use of prismatic glass. It is admitted that in softening or diffusing light there is loss of light, but in this case the additional loss over plain glass will not exceed 2 per cent and, with a better general adjustment, should be less, as with reflectors within the prismatic glass, rays that would otherwise, in crew spaces, go to surface almost in contact with the fixtures, could be utilized to a greater extent. Besides, it is now essential to recognize that the limits of the intrinsic brilliancy of filaments are set by capacity of dynamos, otherwise 32-candlepower lamps might now be in general use on our ships instead of 16. Questions of loss of light become important in connection with questions of power of plant, which reduced to its essential form is expenditure of coal. At present carbon filament lamps are employed on naval vessels. Such lamps as has been stated operate at best at an efficiency of 3.1 watts per candle. The stated efficiency of the Tungsten lamp is only about 1.25 watts and of the Gem Metalized filament only 2.5. A 16-candlepower carbon filament lamp may therefore be rated in total wattage as, at best, about 50 watts and often about 55, while that of a Tungsten lamp of 32 candlepower would be only about 40, thus giving double the candlepower on less wattage. Every 16-candlepower carbon lamp on a ship could be replaced by a 32-candlepower Tungsten lamp with reduction of the load on the dynamos and, consequently, with diminution in the expenditure of coal. But the Tungsten filament is more or less brittle when compared with the carbon filament and may not after trial be found suitable for general use on naval vessels, in view of gun fire and vibrations in general. It would probably give more satisfaction in connection with prismatic glass than any other filament lamp in the illumination of quarters on

shore, and especially at the Naval Academy, where there is reason to believe the acquired myopia is 5 per cent or more.

But the Gem Metallized lamp operates at an efficiency of 2.5 watts per candle, and is a promising lamp for general use on ships. This lamp would seem to render it practicable to more than make up any possible loss of light from using prismatic glass in crew spaces by increasing the candlepower of the lamps themselves without increasing consumption or size of plant. A Gem Metallized 50-watt lamp, operated at an efficiency of 2.5 watts per candle, is a 20-candlepower lamp. It therefore permits the substitution of a 20-candlepower lamp for each 16 candlepower now in use. To make the substitution, without including the use of prismatic glass, would be a serious mistake, as these low watt or high efficiency lamps have also a much higher intrinsic brilliancy than the carbon lamps. They should be placed within prismatic globes, when overhead in crew spaces and used only for general illumination, and within special prismatic fixtures designed for that purpose when used as bulkhead lights.

These high efficiency lamps possess additional qualities of value in the improved character and relative steadiness of light. Flickering or varying brilliancy in a lamp is to be deplored. Fluctuation of voltage is not uncommon on ships, and the ordinary carbon filament responds very readily to such changes, as its resistance decreases as the temperature increases. In a Tungsten lamp the resistance increases with rise of temperature. Even the Gem lamp varies only seven-tenths as much in candlepower for each one volt variation as the ordinary carbon lamp of the same candlepower. A carbon filament lamp is also apt to be in use when its efficiency is below 80 per cent, while the Tungsten is said to have a life of eight hundred hours with burn outs as a rule before the candlepower has dropped 20 per cent. These lamps, both Tungsten and Gem, give a much whiter light than the carbon filament, but operate at much higher temperatures. It may be assumed that the ordinary carbon lamp used on our ships is no longer the best form of filament lamp for the illumination of buildings on shore. There are, however, conditions on ships that keep all apparent improvements in doubt until they have been carefully and extensively tried. Service conditions are something apart from conditions on shore. These lamps are used with great satisfaction on shore and, in relation to ships, it seems to be entirely a question whether they are all excluded by brittleness of filament in relation to ship vibrations. The Gem promises to meet ship conditions in general, and even the Tungsten may be suitable in certain locations. The question can only be decided by trial.

Much of interest might be cited in relation to vapor and vacuum lights of which the Cooper-Hewitt and Moore lights are very prominent at this time. They are suitable for use on shore, and the latter is

probably the very best light for operating rooms, but at the present time it appears that only a filament lamp is clearly suitable for the general illumination of a ship's spaces, unless arc lamps at coaling stations and in firerooms may be regarded as an exception.

However, in the evolution of the system of illumination, shown in the foregoing, attention should not be entirely concentrated upon character of lamp and shade and position of the fixture as a whole, for in the solution of this problem the coloring of a room and of objects within it demands consideration as a most important factor in ultimate results, having an intimate relation to that degree of general illumination without glare essential in any properly lighted space. A room with white ceiling and chrome-yellow walls will have more than double the effective illumination on the same number of candles of a similar room finished, for instance, in emerald-green, dark brown, vermillion, blue-green, cobalt-blue or deep chocolate. White walls give the largest amount of total illumination, but they so reflect light as to cause glare and marked contrast. Our ships are finished in white paint, although it is essential during near work to avoid marked contrasts between the page, having the eye most of the time, and the surroundings, which have the eye more frequently than one is apt to suppose. It is necessary to avoid white, but it is equally necessary, in order to secure the general illumination required to avoid retinal shocks, to have all interior surfaces of living spaces finished in a very light color. These conditions can be satisfied by having walls, or sides, of room, office, or crew space in a light buff or what might be called a white stone yellow. For the same reasons no furniture in a room or office of a ship should be dark, but in view of the relatively large area of wall it covers the natural hue of the light woods should at least be obtained and the top of a desk should be covered with woolen cloth, that it may be free from gloss or capacity to cause glare. Light or yellowish shellac on linoleum of decks is also to be preferred, and obviously no globes or shades designed to permit the passage of light can be satisfactory unless they are kept clean.

If this paper has demonstrated the method by which the artificial illumination of ships can be satisfactorily secured, it has accomplished its purpose. It is recognized that a number of important details belonging within the scope of the subject must be omitted as not within the compass of a thesis of this kind. Yet in view of the importance of the problem the following is submitted, in conclusion, as worthy of careful consideration in the evolution of the system, herein set forth, with the object of avoiding the eye strains too common in our service.

1. *Insufficient illumination.*—On all ships the load on dynamos, as represented by consumption in watts, is very generally jealously watched. In a stateroom one 16-candlepower lamp has been allowed,

but the tendency at present is to allot two such lamps—one a desk lamp and the other overhead for general illumination. The tendency shown by occupants to substitute a 32 for the one 16, now very generally allowed, is *prima facie* evidence of insufficient general illumination at least.

2. *Too much illumination on work.*—There is a natural tendency to exaggerate the quantity of direct illumination which, especially when there is insufficient general illumination, is very damaging. This is facilitated by desk lamps that can be located almost on the work without improving general illumination. Under such circumstances heat may also become a factor. It is essential that both of these factors be eliminated by the abolition of the desk lamp and the location of standard fixture somewhat to the left and at least 5 feet 10 inches from the deck, or 3 feet 4 inches above the desk. The fixtures so located should give 2.6-foot-candles on the work in a stateroom and 3-foot-candles in an office. The advantages of a fixed position for a lamp used in reading or writing are obvious, and among them may be included the declared necessity for eye examination when standard illumination is found insufficient. Men should not be allowed to make up for errors in refraction by increased illumination when they really need glasses, as under such circumstances their defects are increased.

3. *A steady light.*—The lamp selected should not deteriorate rapidly and should be considered in relation to varying candlepower with varying voltage. The force in dynamo rooms should be well trained to secure even voltage. Wide variations in voltage are common on ships. The standard of illuminations (2.6 foot-candles on desks in staterooms, 3 on desks in office, and at least 1.5 on officers' mess tables) are selected to provide for 20 per cent fall in initial candlepower. Reading tables should have the same illumination as a stateroom desk.

4. *Lamps should be so shaded and so placed as to avoid brilliant points in line of vision and shadows on work.*—In securing this result elevation of the lamp is most important and then the use of a shade with such diffusive qualities that the shade itself appears as the source of light (prismatic glass).

5. *The general illumination should be by diffused light and only somewhat less than that of the work itself.*—This can be secured by a lamp within a prismatic globe provided solely for general illumination and by proper coloring of room and contents.

6. *The light reaching the eye should not result from that regular reflection that brings out the sheen or glare incident to gloss of paper.*—This requires the lamp though placed above to be somewhat to one side—the left as a rule.

7. *The illuminated field should be free from streaks.*—This requirement necessitates the abolition of the white polished interior

surface of shades. An uneven illumination of this character is a fruitful source of eye trouble.

8. *Quality of light.*—Troubles as a rule result much more from quantity and mismanagement of light than from quality, except as regards softening of light. A large light surface, or low intrinsic brilliancy, and good general illumination are more important than color of light, except for some special work. Colored shades of much intensity are uneconomical and are apt to be associated with too much iris accommodation, incident to loss in general illumination. A colored shade is, however, much better than an exposed filament. The ordinary carbon filament light is much like that from a kerosene lamp in quality, but its high intrinsic brilliancy makes it a dangerous light in comparison, unless it is properly shaded. The higher brilliancy of the new low-watt lamps makes them still more dangerous without shades. They give a much whiter light, but they tend to accomplish good not so much in that direction as by forcing prismatic glass into general use. That whiteness of light is not as important as has been claimed is shown by the fact that the green light of the Cooper-Hewitt lamp is remarkably easy on the eyes.

There is a rapidly growing disposition to believe that the artificial illumination found in our naval service, afloat and ashore, should be greatly improved. There is no doubt in the mind of the writer that marked improvement is urgently needed. He therefore regards the subject of this paper as worthy of earnest consideration, and hopes that the day is near at hand when a practical solution in all its details of the problem he has presented will result from patient experimentation under naval conditions. Such an investigation should lead to improvements that would greatly lessen the number of complaints and go far to relieve the eye strain that is not uncommon as an incident of an improper system of lighting and, primarily, of the lack of research work necessary for the acquisition of knowledge to overcome recognized objections or to diminish recognized damage.

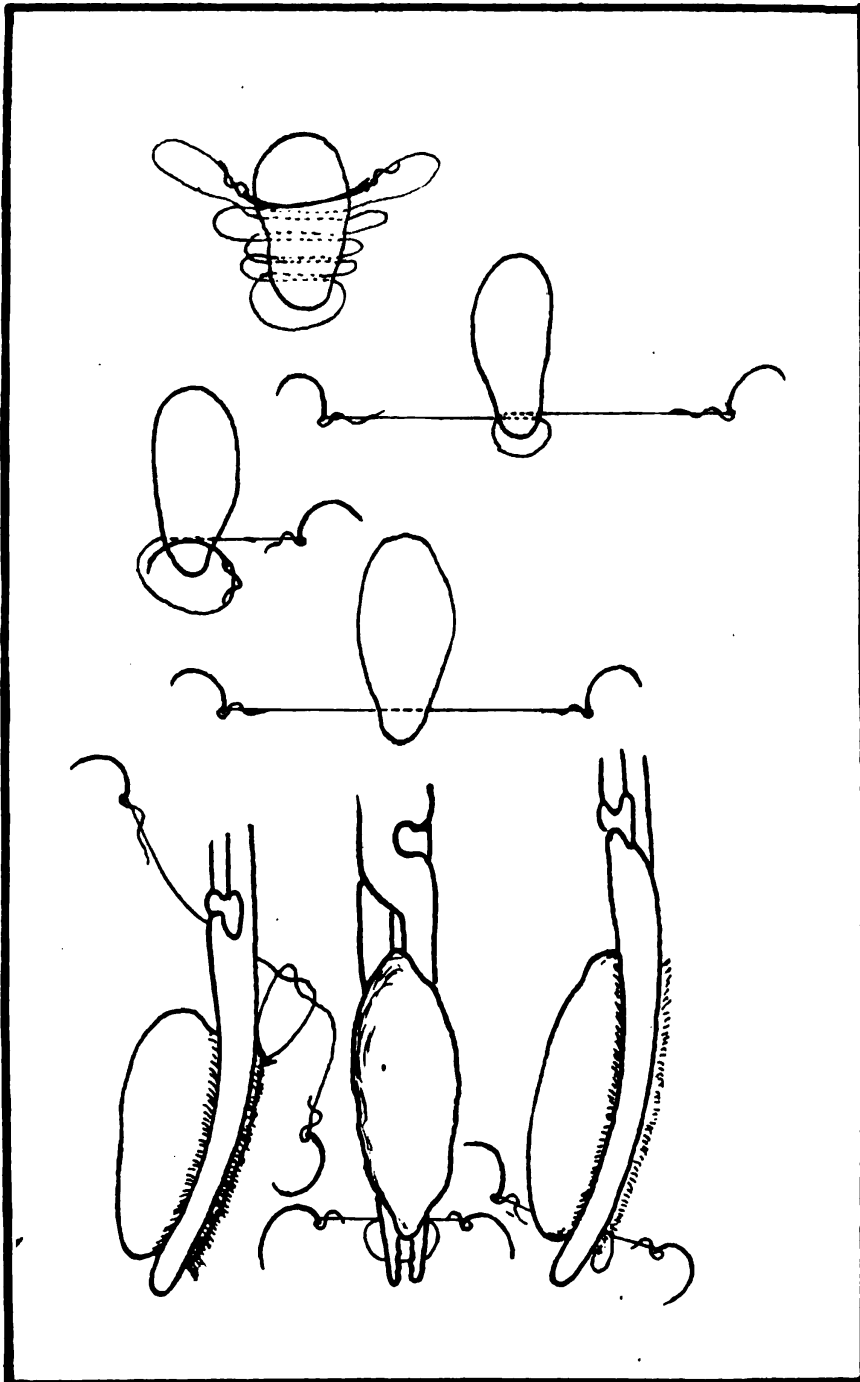
A SIMPLE OPERATION FOR HEMORRHOIDS.

(United States Naval Hospital, Newport, R. I.)

By Passed Asst. Surg. H. F. HULL, U. S. Navy.

A description of the operation for hemorrhoids as performed at this hospital for some time past may be of interest, for like the procedure described by Passed Asst. Surg. Jenness in a recent number of the *BULLETIN*, it is simple, requires but few instruments, and possesses the added virtue that it may easily be done aboard ship. The principal feature of the operation, viz, the stitch, is in fact based

on a description of the Jenness operation I heard in 1905 while in New York hospital, and which through the kindness of Medical Director Harmon I was allowed to use on a patient.



Diagrams illustrating operation for hemorrhoids.

Since that time it has been used by myself and others at this hospital in 19 cases with entire success. Several cases have been seen at varying intervals of time subsequent to operation and all have

expressed themselves as well satisfied with the outcome, while physical examination has shown that a cure has resulted.

Instruments required: One hemostat, 1 tenaculum, 1 pair scissors curved on the flat, 2 needles and some No. 2 catgut.

Operation: After dilating the sphincter, grasp the pile well toward its base with a hemostat. The blades should be parallel with the long axis of the bowel as usual. To obtain a good hold it may be necessary to draw out the pile with a tenaculum. Then take a strand of No. 2 catgut about 8 or 10 inches long and thread on each end of it a full curved or half curved needle. Start to sew at the upper end of the pile—that is, at the distal end of the clamp, entering one of the needles close to and just beneath the hemostat, about one-eighth of an inch from the extremity of the pile. Draw the thread half through. Bring the thread around the free end of the pile and reenter the same needle through the same hole and from the original side. Thus a loop will be formed about this end. This is readily seen on reference to the diagrams. Then follow down along the pile, keeping close to and beneath the hemostat, with an ordinary shoemaker's or harnessmaker's stitch with two needles, making the loops or stitches about one-eighth of an inch apart. This stitch is put in by entering the needles from opposite sides through the same hole and then pulling fairly tight. (See diagram.) The last stitch or loop ends one-eighth inch from the proximal end of the clamp, and the two ends are simply pulled tight and tied about this end of the pile. The pulling tightens all of the loops and thus stops the blood supply. Then cut the pile off close to the upper surface of the hemostat, and lastly cut the long end of the threads, thus completing the operation. Repeat this procedure for each pile. Should any be very large, angry looking, and "bursting" with blood, a back stitch may be taken at about the center of the pile, first pulling tight those stitches already put in.

If a cautery is available it may be used on the raw edges after cutting away the pile, but this is not necessary. As done here we find the few instruments first mentioned to be sufficient.

The after treatment consists of a suppository of opium and belladonna, a rectal plug of gauze, and rubber dam wrapped about a piece of tubing and left in for two or three days. As soon as the plug is removed an oil enema is given. The patient is usually out of bed in a few days.

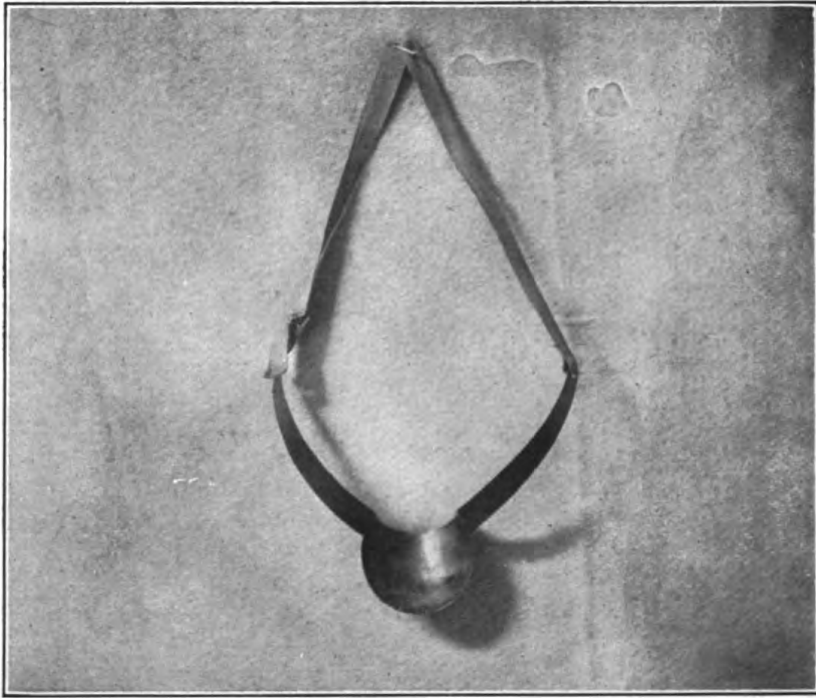


FIG. 1.—METAL SUSPENSORY, SHOWING SHAPE AND CONSTRUCTION.

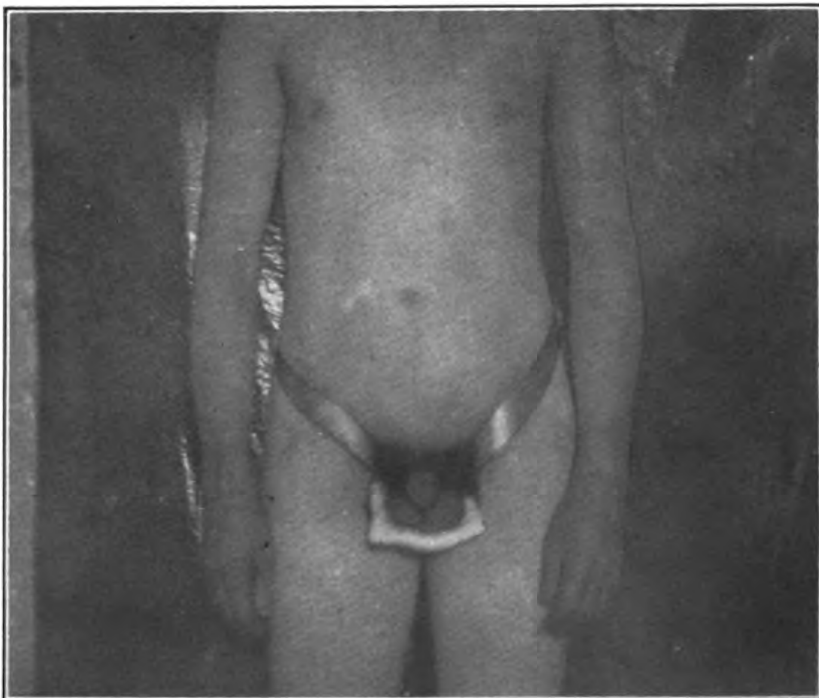


FIG. 2 —METAL SUSPENSORY, SHOWING METHOD OF ADJUSTMENT.

SUGGESTED DEVICES.

A METAL SUSPENSORY.

By Surg. W. B. GROVE, U. S. Navy.

In submitting this device Doctor Grove wrote that its use on board the *Minnesota* had given great professional satisfaction to himself and had been a comfort and benefit to the patients.

In a great number of cases of swollen testicles, from whatever cause, the patients complain of pain from the dragging of the enlarged organ on the cord. To prevent this the following apparatus was devised: A metal suspensory following the general outline of the ordinary one was shaped from sheet copper. The bowl is large enough to contain the enlarged organ and a generous dressing. The bowl and the arms that reach about to the middle of the crest of the ilium are flexible and can be altered in shape to fit different patients. The strap and buckle are the same as attached to the ordinary suspensory and are used for the same purpose.

The advantage of this form of suspensory is that it admits of no possible tension on the cord—it allows of better application of medicaments, it is cleanly by reason of confining the dressing to the part affected—and, last but not least, it is cheap, can be constructed on any ship or in any tin shop, and will last indefinitely. It can be worn at any time that the ordinary suspensory is indicated and the number of days in bed and on the sick list is appreciably reduced.

A SHORT AND ACCURATE METHOD OF CALCULATING THE AGE IN YEARS AND MONTHS.

By Passed Asst. Surg. E. M. BROWN, U. S. Navy.

Medical officers of the service are so constantly confronted by this little problem in mathematics, which is such a fruitful source of error, that I submit the following table, trusting that it will assist others as much as it has me:

First. Find the month of birth in the column at the left.

Second. Find the month in which the examination is being made in the top line. Where these two lines converge, the numeral will be found that indicates the required number of months.

Third. If this numeral is above the diagonal line, the age in years will be found by subtracting the year of birth from the year in which the examination is being made.

Fourth. Should the numeral be found below the diagonal line, the

Month of examination.

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Jan.		1	2	3	4	5	6	7	8	9	10	11
Feb.	11		1	2	3	4	5	6	7	8	9	10
Mar.	10	11		1	2	3	4	5	6	7	8	9
Apr.	9	10	11		1	2	3	4	5	6	7	8
May	8	9	10	11		1	2	3	4	5	6	7
June	7	8	9	10	11		1	2	3	4	5	6
July	6	7	8	9	10	11		1	2	3	4	5
Aug.	5	6	7	8	9	10	11		1	2	3	4
Sept.	4	5	6	7	8	9	10	11		1	2	3
Oct.	3	4	5	6	7	8	9	10	11		1	2
Nov.	2	3	4	5	6	7	8	9	10	11		1
Dec.	1	2	3	4	5	6	7	8	9	10	11	

Month of birth.

On this side of dotted line retain full no. of yrs.

On this side of dotted line deduct one from no. of yrs.

age in years is found by subtracting the year of birth from the year of examination, and deducting 1 from the result.

The following examples are given to illustrate its use:

Date of examination, December 12, 1908.

Date of birth, May 8, 1876.

Age, 32 years 7 months.

NOTE.—In this case the numeral indicating the months, seven, is found above the diagonal line, so the age in years is at once shown by subtracting the two dates.

Date of examination, September 22, 1908.

Date of birth, October 5, 1880.

Age 27 years 11 months.

NOTE.—In this instance the numeral indicating the number of months, eleven, falls below the diagonal line, so the age is immediately shown to be 27 and not 28 years.

Date of examination, September 22, 1908.

Date of birth, October 27, 1880.

Age 27 years 10 months.

NOTE.—Ten months is the result in this example, because the full eleven months would not be complete until September 27, 1908, when the age would become 27 years 11 months.

While this method of calculating is by no means original, I believe this is the first time it has been adapted to the requirements of our enlistment records, discharges, ship's journals, hospital tickets, etc.

CARD FOR INDEX SYSTEM.

(To be used in preparing the smooth quarterly Form "X" at recruiting stations, etc.)

By Hospital Apprentice, first class. C. R. KEEN, U. S. Navy.

This suggestion has several advantages over the old system of using a rough Form "X" upon which to enter the result of the exam-

<u>Accepted or Rejected</u>	<u>Serial No. 273</u>
Name <u>Gibbs, Claude Baker</u> (Surname first)	Rate <u>C. F. 2nd Class</u>
Date of enlistment <u>Sept. 25th 1908</u>	Eyes <u>Blue-gray</u>
Date of birth <u>May 10th '87</u>	Age <u>21-4</u>
Place of birth <u>Los Angeles, Cal.</u>	Hair <u>Yellow</u>
Home address <u>1020 E. 29th St., Los Angeles, Cal.</u>	Comp. <u>Yellow</u>
Next of kin <u>C. V. Gibbs (mother) Los Angeles, Cal.</u>	
Weight <u>129</u>	Height <u>66</u>
Vision <u>20</u>	Color perc. <u>Good</u>
Chest M. <u>35</u>	Exp. <u>3 1/2</u>
Marks and scars, etc: <u>Tattoo</u>	
<u>"4 P.M." back of neck; mole r. s. face; scar l. i. finger;</u>	
<u>2 vaccin marks l. a.; large tonsils; sl. l. varicocle</u>	

ination of each applicant for enlistment. The points which recommend it to use are:

(a) When there are a large number of applicants (as there are at a great many of the recruiting stations and receiving ships) Form "X" is in constant use, and by the time it is filled becomes so soiled that in frequent instances it is impossible to read the data entered, and moreover it is clumsy in contrast to the card, which is convenient and compact.

(b) In making up the smooth Form "X," each name must be set down in alphabetical order. If a rough Form "X" has been used for recording examinations, it becomes necessary either to index it or to go over it a great many times for the purpose of transferring the names and data in alphabetical sequence. By using the index card, arranged as shown to comprise the data required by Form "X," the work of compiling the smooth quarterly report becomes much more simple and expeditious, and further, in addition to facilitating the arrangement of the names of all applicants in alphabetical order, it constitutes an invaluable, permanent, quick-reference file for the medical officer.

CLINICAL NOTES.

A CASE OF ANGINA LUDOVICI.

(Reported from U. S. S. *Tacoma*.)

By Passed Asst. Surg. W. S. PUGH, Jr., U. S. Navy.

Many papers have appeared from time to time dealing with the above-named condition, the most recent being the exceedingly interesting and careful studies of T. Turner Thomas, of Philadelphia, and contributed to the March and April numbers of the "Annals of Surgery, 1908."

It appears that at present we are still in doubt as to the exact etiological factors involved, but at any rate the fulminant nature of the condition indicates that we have to deal with an invasion of the submaxillary tissues in these cases by an agent of great intensity and producing a condition of the utmost gravity and requiring prompt measures. Necrotic teeth are often designated as having a predisposing influence, but in several cases which I have seen the teeth were, in my opinion, in excellent condition. The case in point is as follows:

R. G. Seaman, white, age 27 $\frac{1}{2}$ years, was admitted to the sick list on February 24, 1908, at about 8.30 a. m., complaining of a hard swelling under the right side of mandible, which he stated had sprung up over night, as he had not noticed it while shaving on the previous afternoon. On examination the following condition is revealed:

PHYSICAL EXAMINATION AS RECORDED ON ADMISSION.

A large, flat, hard mass is found beneath the right side of mandible and extending from the angle of the jaw to the symphysis menti and down the neck to a line extending horizontally from the middle of the thyroid cartilage to a perpendicular from the angle of the jaw. The swelling is flat, board like, brawny, and painful to the touch, but does not pit on pressure. There is no redness or discoloration over the mass. Examination of the oral cavity reveals a tense tumor formation most marked along the middle of the inner border of the right mandible, extending almost the entire length of this half, but being most prominent at the center, where it lifts up the mucous membrane and forces the tongue to project to the left side of the mouth to a considerable degree. The swelling on the inner side of mouth causes the patient a little difficulty in chewing and swallowing. Teeth are in good condition, and the mouth and throat reveal no other abnormalities.

Temperature on admission was 100° F. and pulse 90. In the evening the temperature was 99° F. and the pulse 86. Patient was placed in bed at rest and allowed liquid food only. Locally a 1 to 1,000 bichloride of mercury dressing was applied. In addition to the above preparation was made for an immediate tracheotomy should such an operation become necessary.

CLINICAL NOTES.

February 25, 1908. Patient passed a restless night, not so much from the annoyance of the local condition, but chiefly from nervousness and the fear of something happening. This a. m. temperature is 100.2° F., pulse 90, and patient complains of an increase of his dysphagia; also states that his throat feels swollen. Examination reveals a considerable increase in the mass in the oral cavity, and tongue projects more to the opposite side. Patient prepared and operated upon at 10 a. m. Anesthesia by chloroform followed by ether, the anesthetic being preceded one hour by a hypodermic of morphia, grains 1/4, and hyoscine, grains 1/100.

OPERATION.

An incision was made over the mass following a skin-crease from the angle of the right mandible almost to the center of the thyroid notch. The incision was carried down through the superficial tissues, when a little serum with a slight purulent tinge was found. There was no pus. All the tissues were intensely hard and brawny. The incision was now deepened and the submaxillary gland fully exposed, and here a little more serum was encountered. The gland itself did not appear to be involved, but the tissues all around it showed marked induration. The mylo-hyoid muscle was then split with a scalpel handle, and the sublingual tissues exposed. At this point a small drop of pus was encountered. The wound was thoroughly cleaned with peroxide of hydrogen, followed by irrigation with normal saline solution. A large cigarette drain was then inserted at the lower end of wound, extending up to the floor of mouth. The wound was closed for about three-fourths of its length with silkworm gut. During the course of the extensive dissection the facial artery was found and ligated before it was cut. Sterile dressings were applied, and patient made a good recovery from anesthesia. After operation temperature fell to normal and remained so. The wound healed well up to drain despite the fact that the tissues appeared very dark in color for about three days. An offensive discharge required the use of the drain at the lower angle of the wound for about ten days. This discharge was not pus, but a foul-smelling serum. About one week after the drain had been removed the wound was entirely closed. One month later the scar of operation was hardly visible, being almost entirely covered by the neck crease.

A CASE OF VINCENT'S ANGINA.

(Reported from U. S. S. *Lancaster*.)

By Acting Asst. Surg. G. F. CLARK, U. S. Navy.

W. A. T., coal passer, age 19. In the service for the past eleven months. Formerly a fireman on the lakes, for about one year.

Family history.—Two brothers and one sister died of tuberculosis.

Previous personal history.—Had measles and whooping cough in childhood; typhoid at 17.

Social history.—Single; uses no alcohol; smokes about six cigarettes daily.

PHYSICAL EXAMINATION AS RECORDED ON ADMISSION.

General examination (September 6): Man well nourished; muscles firm; height 5 feet 7½ inches; weight 140 pounds.

Local examination: Head well formed; hair flaxen. Eyes: lids appear puffy; eyelashes long and fine; color blue; pupils dilated, but react to light and accommodate for distance; vision 20/20 each eye. Ears: Well formed; hearing normal. Nose: Good formation; nostrils free. Mouth: Lips, buccal mucous membrane and gums are normal. Teeth are slightly irregular. Tongue is clean and is protruded normally. Tonsils are both enlarged and on the left, there is a pseudo-membranous patch about the size and shape of an almond. The patch is greenish yellow in color and when removed leaves a slightly bleeding ulcer. The pharynx is congested. The vocal cords seem normal. Neck: Anterior cervical lymphatics are enlarged. This condition is more marked on the left side. Chest: The left shoulder is elevated. There is a slight lateral curvature of spine. The antero-posterior diameter is lessened. The epigastric angle is decreased. The scapulae are prominent. There is a slight lagging of the left apex during respiration. Tactile fremitus is slightly increased at both apices. Percussion notes are normal. There is slight prolongation of the expiratory murmur at each apex. Vocal fremitus is normal. Heart: Apex in midclavicular line. Second aortic sound increased. There is heard, at the apex, a soft, musical systolic murmur which is transmitted to the left as far as the anterior axillary line. It is more marked after exertion. (Disappeared on September 9 and was not noted on examination for transfer September 12.) Abdomen: No abnormalities noted. Genitalia: Normal except a slight left varicocele and palpable inguinal lymphatic glands. Bones and joints: Normal.

Present illness.—Patient states he first noticed the enlarged glands in the neck about three weeks ago and that he has had difficulty in swallowing for the last four days. He came to this ship from the U. S. S. *Olympia* on September 2, 1908. He reported for treatment on September 4. A smear was made, stained by Loeffler's alkaline methylene blue, and the "fusiform bacilli" and spirochæta found. Admitted September 5, as with Vincent's angina. A urinalysis on September 5 gave: Odor, normal; color, straw; reaction, acid; specific gravity, 1.026; no sugar, albumen, or casts. Another examination on September 6 gave a like result.

Symptoms: Were not well marked. Slight malaise, some difficulty in swallowing. Temperature ranges, 99.2°–98°; pulse, 86–74; respiration, 20–18.

Treatment.—Locally, nitric acid (c. p) was applied, after removal of pseudo-membrane, once daily for two days. The mouth was immediately rinsed with water. A saturated solution of potassium chlorate was applied three times daily. Potassium chlorate, grains 3, was given internally three times daily. The patient rapidly recovered and was discharged to duty on September 10.

Comment.—Herrman ("Archives of Pediatrics," November, 1905) states that Vincent noted the association of "fusiform bacilli" and spirochætæ in an article on hospital gangrene (1895), but that the credit for accurately describing the clinical, bacteriological, and histological findings in ulcero-membranous angina belongs to Bernheim and Popischill (1897).

He believes the "fusiform bacilli" and spirochæta to be different forms of the same organism and that the spirochæta of necrosis (as he called it) is the same as the spirochæta sputigenum and spirochæta dentinum of other writers. He says that in the beginning the process is purely a local one, with slight constitutional disturbances, and death is due to toxemia, resulting from secondary infection. He believes the primary lesion to be a gingivitis and that the cheek, tonsils, tongue, and other parts are affected secondarily, and that there must be some physiological change of the tissues before the organism can thrive. Measles, diabetes, leukemia, scurvy, etc., may precede the condition.

He recommends the early and thorough use of the cautery.

Weaver and Tunichiffe ("Journal of Infectious Diseases," January, 1908) have very carefully gone over all the literature of stomatitis, and furnish an excellent bibliography. They quote Perthes (1902) in stating that the spirillæ are terminal enlargements or stages in development of "fusiform bacilli."

They report that Tourdes states the symptoms to be mild in character until gangrene develops, and credit Seibert with emphasizing the local application of acids.

It is believed that this disease is not as rare as generally supposed, and that it may be easily confounded with diphtheria, as was recently the case at one of the service hospitals.

RUPTURE OF THE IRIS—TWO CASES.

(Reported from United States Marine Barracks, Santo Domingo, Cuba.)

By Passed Asst. Surg. R. E. RIGGS, U. S. Navy.

K, J. P., private, Company L, U. S. Marines. Admitted June 16, as with Iridio ruptio (left eye).

Origin: In line of duty, having occurred spontaneously during the night. There was no history and no evidence of a blow or other injury having been received. Excessive and prolonged contraction of the

pupils caused by the glare of the tropical sunlight is regarded as the cause of the injury.

Upon awakening on the morning of admission the patient saw double, and experienced sharp, burning pain in his left eye, and imagined that "a ball of fire" was falling across his field of vision about every fifteen minutes.

Upon examination it was observed that the iris of the left eye had torn away from its ciliary attachments at a point directly above the pupil. The arc detached would subtend an angle of about 30 degrees. In consequence of the separation at the circumference, the iris, when contracted, extends into the pupil as a point, leaving a semilunar opening above through which light passes freely. This causes double vision, and blurring of vision as well.

The eye was examined carefully and separately with the ophthalmoscope, but no pathological changes were seen, except that the reflex from the fundus was plainly visible through the adventitious opening. A solution of atropine was employed at first, and the eye covered with a compress, and the patient was instructed to remain quiet and in a darkened room.

Dilation of the pupil failed to approximate the torn edges and no benefit was derived from the treatment. The patient was finally transferred to the post hospital, Habana, Cuba, on June 25, the disability being regarded as permanent.

A similar case occurred at this post March 21, 1907, the following being an extract from the Medical Journal of that date:

R. H., private, U. S. Marine Corps, Company I; born February 5, 1882, Fall River, Mass.; enlisted January 26, 1906, at Lowell, Mass.; Iris laceratum; origin not known; incident to the service. On the morning of the 19th instant a friend called patient's attention to black spot in right eye. Patient also experienced a burning sensation in eye. Examination shows small area of extreme lower portion of iris detached, making a black spot. Pupil slightly irregular above and to nasal side of center. Reacts slowly to light.

(Signed) C. H. DUDLEY,
Hospital Steward.

Hospital Steward Dudley informs me that this patient also complained of seeing "a ball of fire" falling across his field of vision frequently. This patient was finally transferred to Base Hospital, Habana, for treatment, but the subsequent history of the case is not known.

WOOD ALCOHOL POISONING; 13 CASES; 3 DEATHS.

By Passed Asst. Surg. R. A. BACHMANN, U. S. Navy.

On the evening of January 9, while at the navy-yard, Mare Island, several of the crew of the U. S. S. *St. Louis*, including Ho., a chief yeoman; Ha., a blacksmith; C., an electrician; W., a fireman, second

class; and S., an electrician, obtained a can of rubber cement used by the workmen of the yard in laying linoleum and precipitated the rubber from it. These men drank the resulting clear fluid, chiefly wood alcohol, mixed with milk and sugar.

The drinking continued all day Friday and that night. The amounts each man took and the percentage of methyl alcohol in the various mixtures they made could not be determined.

About midnight Ha. was found in front of the blacksmith shop unconscious; a few minutes later W. was brought into the sick bay partially conscious and in pain. Ha. received an injection of apomorphine, strychnia, and atropine, but failed to respond, and without regaining consciousness died about 12.30 p. m.

W. received a hot bath and sirup of ipecac, which produced vomiting four or five minutes later. He seemed to feel better after that, and strychnine and atropine, as well as black coffee, were administered.

An hour after he had been brought in he became unconscious; respirations and pulse were accelerated, and finally, becoming running, they ceased about 4.06 a. m. During my absence from the ship Doctor Anderson attended these cases.

C. and S. came to the sick bay during this time, C. with the assistance of the master-at-arms. S. received black coffee and was told to report in the morning. C. was given apomorphine, strychnia, and atropine. He vomited four or five times.

Upon my arrival in the morning I found 11 men, including the above named, suffering more or less from the effects of drinking the wood spirits. All but 6 were discharged, showing little or no effects. Three others were discharged the day following, having received no medication—simply milk and rest.

Ho. requested treatment about 7 a. m., January 12. He had been ill all day of the 11th. His breathing was the most marked sign. It was increased to about 20 and labored. His pulse was 110. He complained of amblyopia, headache, and some gastric distress, but did not vomit, although he had done so the day before. Received milk and hypodermic of strychnine. About noon his pulse went to about 112 and respiration to about 25; vision became dimmer, pupils becoming dilated and eyes staring. He could distinguish faces easily. At 4 p. m. 500 cubic centimeters of salt solution was injected and about 15 dry cups applied to infrascapular regions. The patient's mind, so far clear, now betrayed a slight delirium. Temperature ranged from a half to a degree subnormal.

Respirations were blowing in character and resembled those of the stage of stimulation in ether anæsthesia. The urine contained albumin. Digitalin, 1/100 grain every six hours, was added to the strychnine, 1/30 every three hours.

The patient's condition gradually became more pronounced. All the signs and symptoms increased, his skin was moist, respirations were accompanied by groaning, pupils were dilated, and consciousness was lost. No improvement occurred during the night nor the next day. The pulse showed no response whatever to medication, and continued to grow more rapid. At 3 p. m. another injection of salt solution was given without the slightest effect. At 6 p. m. his pulse was 165 and respiration was 45. He died at 7.55 p. m.

S., whose symptoms were chiefly gastric, improved rapidly and was discharged on the 16th. His sight was completely restored.

C. improved also. His pulse, which had been 110, dropped to 90 the next day. His pupils were dilated, but he could distinguish the outlines of small objects, such as electric light bulbs 10 feet distant. On the 15th his vision became obscure and showed no improvement up to his discharge to the naval hospital, Mare Island, January 22. At that time he could barely distinguish fingers held 18 inches from his eyes. No retinal change could be observed. His general condition was good.

All other cases regained former health.

Post-mortem findings.

Case of Ha.	Case of W.	Case of Ho.
Stomach: Empty; small hemorrhagic points and injected vessels over greater part of mucosa, chiefly at fundus; viscid yellow mucus adherent to membrane.	Stomach: Empty and similar in appearance to that of case of Ha.	Stomach: Empty; mucosa dark and injected; small hemorrhages into membrane visible over entire surface.
Intestines: Duodenum and jejunum distended with gas; contained fecal matter, soft and deeply tinged with bile; lower part of ileum slightly injected.	Intestines: Contained much gas, but otherwise normal.	Intestines: Much distended by gas; lower ileum congested.
Liver: Congested about borders; otherwise normal; gall bladder distended.	Liver: Congestion, chiefly lower border of right lobe.	Liver: Congested; cut surface dark and oozed blood.
Kidneys: Congested (liver-colored); otherwise normal; cut easily.	Kidneys: Congested; cut easily; cut surfaces oozed blood; capsule nonadherent.	Kidneys: Markedly congested; very dark in color; capsule free.
Bladder: Distended to 3 inches above pubis.	Bladder: Distended.	Bladder: Distended.
Lungs: Contained bloody froth; much pigmentation; floated; both lower lobes congested and of greater consistency than rest of lungs.	Lungs: Showed more marked congestion than case of Ha.; cut surface dark red, especially lower lobes; oozed blood and bloody froth; floated.	Lungs: Lower lobes congested and consistency increased; oozed blood; upper lobes oozed bloody froth; entire lung floated.
Heart: Normal; pericardial fluid clear.	Heart: Left ventricle collapsed; otherwise normal; pericardial fluid clear.	Heart: Left ventricle collapsed and contained large ante-mortem clot; pericardial fluid cloudy.
Brain: Meninges slightly injected; optic commissure and nerves apparently normal; region around pituitary body congested; rest of brain surface and cut sections of lobes, cerebellum, crus, and pons revealed nothing abnormal.	Brain: No changes apparent, macroscopically.	Brain: No changes apparent, macroscopically.

Microscopic examination of section of optic commissure made in one case was negative.

COMMENT.

Methyl alcohol seems to affect either the respiratory or cardiac centers of the peripheral nerves. If the latter, the change must be a rapid neuritis affecting chiefly the optic and pneumogastric nerves. This action is prolonged and may not culminate for five or six days. Therefore favorable prognosis is not to be made until that number of days has passed. All internal organs are congested. Cardiac and respiratory stimulants as well as normal salt injections are useless, except, perhaps, in mild cases. The disturbance of vision progresses or recedes irrespective of the general condition.

A CASE OF VIRULENT CHANCROIDS.

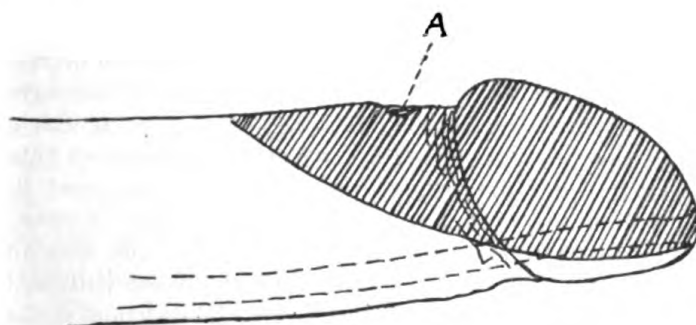
By Asst. Surg. D. C. CATHER, U. S. Navy.

H. L., ordinary seaman, age 19 years, presented himself at sick call on October 9, 1906, with a sore on his penis. This sore was on the dorsum just to the left of the median line and about an eighth of an inch behind the corona. It was about the size of a dime, and was covered with a thin, watery, yellowish pus. The surrounding tissues were slightly œdematous. He complained of considerable aching pain.

He gives a history of having had an open sore on his penis at the time of intercourse with the woman in Naples, Italy. This sore was contracted before the ship left New York, the last week in August. He had been treating himself. On the second day a thin, blackish scab had formed over the sore, the œdema was greater and had extended to the prepuce and glans. The pain had increased and the patient was in positive misery, so that morphine had to be given. On the third day the process had extended to the glans, which was evidently undermined, as the whole upper surface of the glans presented a bluish-black tinge. It had also extended backward on the penis for about $1\frac{1}{2}$ inches. The prepuce was so œdematous that it could be retracted only with difficulty. An incision was made on the dorsum about $2\frac{1}{2}$ inches long so as to expose the whole infected area. It was found that the entire dorsum of the penis for about 2 inches was covered with a slimy, blackish, sloughing mass. As much of this as possible was removed with forceps and scissors. The treatment on the first day consisted in immersion of the penis in hot bichloride of mercury solution (1:1,000) for ten minutes every half hour, the sore in the meantime being carefully dried and dusted with iodoform. The same treatment was given on the second day. On the third day it was found an incision would be necessary to expose the infected area, and this was done as described above. After removing the sloughs the whole area was covered with Ricord's paste, which was

allowed to remain for about four hours. Bichloride of mercury irrigations were then given every two hours. The area was then carefully dried and packed with iodoform gauze. Only one other application of Ricord's paste was necessary before the spread of the infection was stopped. From this time irrigations of bichloride of mercury and packing with iodoform gauze twice a day was the only treatment made.

When all the slough had separated, it was seen that the patient had lost the entire upper part of the glans extending down to the urethra at the meatus. For about a half inch the urethra had been exposed and only the floor remained. From the glans backward about $1\frac{1}{2}$ inches the entire dorsum had been lost, the disease having eaten out the dorsum in a curving manner, as shown in the accompanying drawing.



A. Seat of initial sore.

▨ Area destroyed by ulcer

Three somewhat similar cases were reported in *The Lancet* (London) of September 14, 1907, under the caption "Intractable slow-spreading destructive ulcer of the penis," in one the process going on to the complete destruction of the penis; in the other two to considerable loss of substance (from 1 to 2 inches). In each of these cases the initial lesion was situated either on the glans penis or in the preputial fold. The writer goes on to say:

The ulcers had no covering slough, exuded a serous fluid, which was, however, at times slightly purulent; the edges were slightly undermined, though here and there raised, and the bases were indurated to a slight degree. They were practically painless, the lymphatic cords were not thickened, and the inguinal glands were but slightly enlarged. The patients showed no signs of syphilis, and, although in hospital for several months, exhibited no signs of this disease in spite of having no antisyphilitic treatment.

The first case that I had from the beginning under my own observation was considered to be simply an enlarged, neglected, soft sore, but finding that week after week, in spite of all kinds of treatment, the ulceration steadily spread, destroying the surrounding and underlying tissues, including the urethra, it was found necessary to reconsider the diagnosis. Smears from these two cases

were examined on several occasions, sometimes taken from the surface, sometimes after the superficial tissue had been scraped away, and were found to be composed of necrosed tissue, many cocci, mainly diplococci, and a large number of bacillus fusiformes. There were no bacilli giving bipolar staining similar to Ducrey's and no spirochætæ were found. There was no Giemsa solution, but "pallida" was stained for by prolonged Leishman's staining.

The various treatments employed were: 1. Dusting with boric or iodoform powder. 2. Hot boric fomentations every three hours. 3. Hip bath with perchloride of mercury solution ($\frac{1}{1000}$) three times daily for from one to one and a half hours at a time; on one occasion a local bath was used for twenty-four hours consecutively, at the end of which time the patient presented symptoms of poisoning (intestinal cramps, vomiting, and diarrhea). 4. Lysol and carbolic baths. 5. Cauterization with silver nitrate stick. 6. Very extensive scraping, followed by swabbing with pure carbolic. 7. After all these methods had failed, mercury and iodides, with local antiseptic treatment, were given without any results (second case).

In spite of treatment, the condition spread continuously and steadily, and the first two cases seemed to get well, owing to the destructive process coming to a natural end rather than to a termination procured through treatment. The third case came to hospital and proceeded just as the others had done, and after some weeks about $1\frac{1}{2}$ inches of the penis had been destroyed, and the only hope seemed to be that nature would step in and cause the process to end. Fortunately, a new Egyptian medical officer took charge of this ward, and he suggested trying turpentine. This was accordingly done, and the ulcer, which had been spreading imperceptibly but steadily for nearly one and a half months, began at once to present a more healthy appearance and was almost healed in a week. The oil of turpentine was applied on small lint pads to the ulcer. The oil of turpentine was probably old, but how old I can not say, nor do I know whether it was American, German, or other particular kind; these points are mentioned because the properties of turpentine are said to vary both with age and with the species of pinus from which prepared. Perhaps the curative action was due to hydrogen peroxide, which turpentine produces with air in the presence of water. Unfortunately, no new cases have come under observation and so it is difficult to say whether the rapid healing was a coincidence or really due to the action of this drug; however, the Egyptian medical officer stated that he had treated other similar cases with this drug with like good results.

This seems worthy of recording, since the results of this type of ulceration are appalling, and if met with in other parts of the world the treatment by turpentine (or perhaps hydrogen peroxide) might be of great value.

The use of Ricord's paste, as in the case above described, was certainly effective in combating the destructive process, and is also worthy of further trial in the treatment of this distressing condition. Thorough cauterization with the actual cautery *under general anaesthesia* gave excellent results in a similar case at the New York Naval Hospital.

**A CASE OF SEPTICEMIA SUCCESSFULLY TREATED WITH STEARN'S
STREPTOLYTIC SERUM.**

(Reported from the U. S. S. *Charleston*.)

By Surg. M. F. GATES, U. S. Navy.

The patient, C. D. J., fireman, first class was attached to the U. S. S. *Preble*. In an altercation he received a lacerated and contused wound of the scalp, which was sutured on shore. Three days later he was brought to this ship for treatment, with the scalp and face œdematous, the wound suppurating, and with marked constitutional disturbance. Sutures were removed, the wound extended, and wet dressings applied. Next day, under chloroform anæsthesia, free incisions were made into fluctuating and œdematous areas over the cranial vault, occiput and mastoid regions, and rubber drainage tubes inserted where possible. Notwithstanding free discharge of pus, drainage being facilitated by additional incisions wherever indicated, the œdema and suppuration extended, and the greater portion of the scalp lifted freely from the skull under pressure of the irrigating stream. His face was tensely swollen; eyes closed; temperature ranging to 103.8°; his appearance was bad and condition appeared to be serious. The pus showed apparently pure culture of streptococcus. On the 13th he was given two hypodermic injections of 10 cubic centimeters each of Stearn's streptolytic serum (obtained in San Diego). The evening temperature was 103.4°. No particular result was noted. On the 14th three injections were given. Evening temperature was 104.2°, but his condition appeared to be better. On the 15th he received two injections; evening temperature was 102.4°, and considerable improvement noted. More serum was not given, as the supply was limited and one dose was held in reserve.

Improvement continued uninterruptedly, suppuration not extending into new areas after injection of the serum. Cultures were not made, but the streptococci disappeared from the pus in a few days. It is my opinion that in this case the serum was of great value and probably averted a fatal termination.

AN UNUSUAL CASE OF UNDESCENDED TESTICLE.

By Passed Asst. Surg. E. M. BROWN, U. S. Navy.

"R. H. R.," aged 22, an applicant for enlistment, was rejected on account of undescended right testicle. The left testicle was normal and in position. The right side of the scrotum was empty, and a search for the testicle along the right inguinal canal proved negative.

On the left side in the inguinal canal, above the normal left testicle, was a well-marked swelling, which on inspection only would have

been taken for a small hernia. Palpation showed it to be about the size and shape of a dove's egg, smooth and firm, having the consistency of testicular tissue, freely movable upward in the canal, but only slightly so downward, and on tension a cord-like attachment at the upper pole could be defined.

Evidently during foetal life the right testicle had migrated to the left side of the abdominal cavity, and then, during the descent of the testicles, had attempted to follow the left testicle down the left inguinal canal, but was prevented on account of the length of the cord.

CURRENT COMMENT.

It is to be remembered that in the publication of these comments the Bureau does not necessarily undertake to indorse the opinions expressed, but will lend the pages of this section to discussion of such contemporary topics as will be of interest and value to the service.

United States Pharmacopœial Convention.

The bureau has received notification that a call will soon be made for delegates to the United States Pharmacopœial Convention, to be held in May, 1910. It is the desire of the bureau that the medical officers and pharmacists of the navy shall interest themselves in this important work, particularly in view of the greater importance which the "Pharmacopœia" has assumed by reason of its adoption by the Government as the legal standard in the national pure foods and drugs act. To this end, and to invite a free expression of views, the bureau will receive any criticisms based on the present "Pharmacopœia" or suggestions for the next revision, and will, at the proper time, place them in the hands of the delegates to be designated to represent the navy at the pharmacopœial convention.

CONCERNING EXTRACTS AND ABSTRACTS FOR PUBLICATION.

In the section "Progress in medical sciences," under the heading "Hygiene and sanitation," will be found an extract forwarded for publication by Surg. L. W. Curtis. Mention is made of this contribution because it is an example of the interest which it is desired that all medical officers and members of the Hospital Corps should take in bringing important professional news to the attention of the medical branch of the navy.

In forwarding his extract, Surgeon Curtis says:

The inclosed extract from a translated edition of the "Surgical and Medical History of the Naval War Between Japan and China" is thought of sufficient professional interest to merit publication in the UNITED STATES NAVAL MEDICAL BULLETIN. As an illustration of the zeal and thoroughness in official dealing with sanitation in the Japanese navy ten years ago light is thrown on the achieved results at a later period, in the war between Japan and Russia.

GRADUATED SCALE FOR MEASURING THE HEIGHT OF RECRUITS WITH PROPORTIONAL WEIGHT AND CHEST MEASUREMENT.

	<i>Inches</i>	<i>Pounds</i>	<i>Inches</i>
(6 ft)	72	169	36 $\frac{1}{4}$
	71	162	36
	70	155	35 $\frac{1}{2}$
	69	148	34 $\frac{1}{4}$
	68	141	34 $\frac{1}{2}$
	67	134	34
	66	132	33 $\frac{1}{2}$
	65	130	33
(5 ft. 4 in.)	64	128	32 $\frac{1}{2}$

Each division of the section "Progress in medical sciences" is of necessity placed in charge of one officer (in some cases two), who then becomes the regular contributor to that division; but this organization does not exclude reviews or extracts which may be sent in from officers serving in various parts of the world. On the contrary, if any officer runs across an article in a foreign or special journal or a publication containing information which he may regard as of value to the service and which the service as a whole is not likely to see, an extract from or an abstract of it will be most acceptable for the **BULLETIN**. All contributions of this character will be placed in one or another of the various divisions according to the nature of the subject, i. e., surgical, medical, or otherwise, and the author will be given full credit. It is requested that contributions of this character be accompanied by full reference data, showing the source of the matter submitted, as is now printed at the top of each abstract in current numbers of the **BULLETIN**.

MEASURING THE HEIGHT OF RECRUITS.

Some discrepancies have been noted in the data as recorded on the enlistment records of recruits at recruiting stations and as verified at the receiving and training stations. It is noticed that the chief error is in the height, and it may not be amiss to call the attention of the service to the cause of error which Passed Asst. Surg. E. M. Brown found to have been operative at the Los Angeles recruiting station. The weighing scale used is the "Jones," which combines a sliding scale for measuring heights. It was found that on varying the position of the recruit on the scale platform from the center to a little back of the center a variation of from three-fourths to 1 inch in the height was obtained. This was due to the tilting of the scale platform, a defect not amenable to correction, so that the use of the scale for measuring heights was discontinued and, in substitution, a graduated scale similar to the one in the accompanying illustration was drafted on paper and pasted on the casing of the door at the proper height. This is found to be convenient, because it gives at a glance not only height, but the proportional weight and chest measurement.

This matter is brought to the attention of the service, as no doubt at other recruiting stations where the "Jones" weight scale is in use the occurrence of errors has not yet been observed.

SUGGESTIONS FOR THE STUDY OF HEAT EXHAUSTION.

[Variously called heat or muscular cramps.]

The condition known as heat exhaustion, common in the navy, as in all maritime services, is one which we should be giving more diligent scientific study. The fact that it seems to be a distinct pathological entity should be enough to whet our professional curiosity and stir us to a thorough investigation, but the frequency of the condition (estimated at about 5 per cent of the engineers' force) and its serious character makes it obligatory upon all who have the opportunity to exert their best efforts toward the determination of its pathogenesis. There is little or nothing on this important subject in medical literature, so that it offers a splendid field for pioneer work—yet enough has been done to show that we must materially change our views as regards the nature of the disease and revise our methods of treatment along rational lines in accordance with its true etiology. No one can honestly say that the therapeutic measures employed up to date have been other than clumsily empirical. Any contribution to our present meager knowledge of the nature of the condition will be appreciated—not only by the bureau as an aid in its studies but by the profession in general. Among others, Dr. D. L. Edsall, associate of the Pepper Clinical Laboratory, is actively interested in the subject and has kindly offered to communicate the results of his studies to the Surgeon-General and to give all assistance possible in the solution of the problem involved in heat exhaustion. In this connection we print the following list of points, along which it would seem any such study as above contemplated should be conducted. While of course they are merely suggestions—a groping in the dark, as it were—they nevertheless represent a guide to the accumulation of data which may be more or less valuable.

1. Racial susceptibility.
2. The physical condition and habits of the men exposed to those conditions suspected of producing heat exhaustion.
3. The relation of the habits of men so exposed as regards smoking, drinking water or alcoholic beverages, and diet (and their amount) to the time of exposure or to the development of heat exhaustion.
4. Temperature and humidity (wet and dry bulb thermometers) of atmosphere of compartments in which men are exposed. Great care should be taken in securing a true wet bulb reading. It has been given as an observation that when this thermometer registers 81° F. the men exposed become uncomfortable and that when it registers from 86° F. to 88° F. the symptoms of heat exhaustion are apt to develop.
5. The amount and character of fluid ingested during exposure and the bearing of sudden changes of temperature, either under ventilators or by coming on deck, on the development of heat exhaustion.
6. The rôle of increased air pressure or increased muscular effort or both under circumstances of forced draft in the production of heat exhaustion.

7. The physical condition of the men exposed as regards fatigue.
8. Musculature—the character and location of spasms, whether symmetrical or not, and the existence or absence of fibrillary contractions between spasms.
9. Reflexes—their state and the existence or absence of Trousseau's,^a Chvostek's,^b Erb's,^c and Hoffmann's^d signs of tetany.
10. The blood pressure of the engineers' force. (a) Under normal conditions; (b) during exposure to conditions productive of heat exhaustion; and (c) while suffering the condition of heat exhaustion.
11. The effect of shutting off the blood supply to a part affected by contractions, as by the cuff of a blood pressure apparatus.
12. The urine before, during, and after attack, with reference to the possible existence of toxic irritation and chlorine constituents, etc.
13. The character and degree of blood changes—blood counts, etc.
14. General condition of the nervous system and any special occurrence under this head, particularly as regards the vaso-motor system.
15. The degree of moisture of the skin and the reaction of the sweat.

Thorough post-mortems should be made and attention given to evidence of concomitant disease (such as syphilis); to the nervous system, particularly the brain; to the vascular system; to the excretory organs; and to muscle tissue. Sections should be examined or sent in to the Naval Medical School laboratory for examination as to degenerative or other changes. It has been suggested that in cases which end in recovery specimens of muscle tissue might be obtained under local anaesthetic for microscopical examination.

These questions arise: (1) Is the condition one of auto-intoxication resulting from the retention of waste products through the suppression of the kidneys or the exhaustion of the sweat glands; (2) is the condition one of auto-intoxication resulting from the development of toxins through a perverted metabolism, and if so what; (3) is the condition due to a combination of the poisons from both sources, acting through the central nervous system upon the vital functions and bringing about tissue changes in various parts of the organism primarily in the muscles, the painful contractions of these constituting the premonitory symptom or warning of the final collapse which often supervenes and surely will supervene in every case that is not relieved early and given timely treatment; (4) is the condition simply due to the mechanical effect of the excessive loss of body fluid, together, possibly, with the reduction of certain salts, as is seen in cholera?

^a Trousseau's sign—production of spasm by prolonged, severe pressure upon the nerve trunks, particularly the median nerve.

^b Chvostek's sign—the muscles show marked irritability to mechanical stimuli, particularly those of the face, and twitching may be caused by tapping upon the trunk of the facial nerve, upon the malar bone, or over the infra-orbital foramen.

^c Erb's sign—the muscles show extreme electrical irritability (contract to very weak currents) and in some cases AOTe and COTe have been obtained.

^d Hoffmann's sign—the patient is extremely sensitive to the induced current.

That it may be due to the excitement of the central nervous system, as indicated in the above third alternative, would seem to be suggested by the fact that the examination of the central nervous system, in reported autopsies, elicited all the signs of intense congestion; that the muscular spasms are often symmetrical; that the heat regulating mechanism is disturbed; that the pulse and respiration are persistently rapid (except in the latter when the spasm affects the diaphragm and other respiratory muscles); that in many cases there are repeated attacks of explosive vomiting; and that when death ensues the heart (left ventricle) stops in firm systole.

PERFECTED ROUTINE OF DOSAGE, ETC., IN THE TREATMENT OF TUBERCULOSIS BY THE ADMINISTRATION OF MERCURY.

(United States Naval Hospital, Las Animas, Colo.)

By Surg. B. L. WRIGHT, U. S. Navy.

We believe that mercury acts in two ways: First as a tonic increasing the vitality of the cellular elements of the various organs and tissues, and second that it renders the blood bactericidal, producing an antitoxin therein which has a direct destructive action upon the tubercle bacillus.

This action of mercury is cumulative and lasting, and the immunity conferred by the early doses, plus the resistance to the disease developed by the increased cellular vitality, places the patient in such condition that as treatment is continued, smaller doses of mercury are required to obtain the desired results.

If we continue to give the improving patient the same dose of mercury upon which he was first placed and began to improve, we will sooner or later notice: First a rise in temperature, second a loss of weight, and should these signs be passed unnoticed, it is probable that more or less serious damage would result; possibly an active general cellular degeneration, including the cellular elements of the blood would occur, resulting in more or less permanent damage to the patient, if not a rapid decline and death.

It is only by close observation of each individual patient that the original and succeeding dosage can be determined. Never push the drug to the point of salivation.

Our experience with this method of treatment has shown us that the maximum dosage for the original series of injections can not be carried much beyond 30 injections, without producing the symptoms mentioned above, and that after a period of rest, upon resuming the injections, that the dose carried through the second series of injections must be reduced.

Our routine therefore has been developed by experience as follows: One injection (hydrargyrum succinimidum) 0.013 gram (grain $\frac{1}{4}$) every other day until 30 injections have been given.

Then to discontinue injections and give potassium iodide 0.2 gram (grain iii) to 0.648 gram (grain x) well diluted with water one-half hour after meals for two weeks.

Then discontinue potassium iodide, and give no medication for one week.

Then resume injections as follows: One injection every other day until 30 injections have been given; on alternating injection days give hydrargyrum succinimidum 0.013 gram (grain $\frac{1}{4}$) and 0.006 gram (grain $\frac{1}{10}$), respectively.

After the thirtieth injection, give the same course of potassium iodide as followed the first series of injections; then a week without medication.

Then resume the injections, giving an injection of the succinimide 0.006 gram (grain $\frac{1}{10}$) every other day until 30 injections have been given.

By the end of the third series experience will direct any necessary further treatment.

The above dosage is not to be considered absolute, but only a guide; close observation of each individual patient must fix the dose of the first series of injections.

At times the initial injection will produce a slight febrile reaction, after which the temperature should fall to what it was prior to the injection. Should this drop not occur, or should the rise in temperature occur after the second injection, experience has taught us that the dose administered was too large and should be reduced at once.

HAS THE CHEMICAL ANALYSIS OF WATER PRACTICAL VALUE TO THE MILITARY MEDICAL OFFICER?

By Pharmacist P. J. WALDNER, U. S. Navy.

The article on "The composition of potable water," which appeared in the October number of the Naval Medical Bulletin, contains certain statements which are open to debate, and exception is taken to the soundness of several inferences which the writer has made from his observations. Incidentally, the question of the practical value of chemical examination of water to a military medical officer naturally suggests itself. There is no desire to underrate the value of chemical analysis of water for scientific and certain industrial purposes but it is believed that we are misdirecting our energies, for practical sanitary ends, in studying and practicing methods which give findings that lead to no definite conclusions. A careful

consideration of the deductions based upon the determination of a chemical analysis, as set forth in the article under consideration, either as regards any single ingredient or all of them taken as a whole, leads to the belief that conclusions thus derived are apt to be confusing, misleading, and unsafe from a hygienic standpoint. It would seem that detailed chemical analysis should be supplementary, but entirely subordinate, to a bacteriological examination, and that a study of the geological and geographical nature of the surroundings of the source and collecting reservoir, as well as the means employed for its transportation and distribution, should largely influence an opinion as to the fitness of a water for drinking purposes. Ruffer and Willmore, in the *Journal of Hygiene*, September, 1908, have graphically shown how dangerous, upon bacteriological examination, many waters were found to be—waters which were in many instances obtained from sources of hitherto unquestioned character, but which upon examination indicated infection either at the source, during transportation, or in the storing reservoir. Capt. R. T. Brown, royal army medical corps, writing on this subject in the *Journal of the Royal Army Medical Corps*, August, 1908, says:

With present day knowledge, the most reliable opinion upon a water supply can be obtained from inspection with bacteriological examination of the supply, and that—

the chemical examination is difficult, owing to the large amount of material required; and though this may be avoided by the use of one of the portable cases of reagents for water examination now on the market, we have still to remember that, in whatever way it is carried out, this form of examination is very unreliable.

It is not necessary to subject a water to chemical examination to determine whether or not that water is "fit to drink" in so far as content of organic or inorganic salts is concerned; our sense of taste can tell us that; but it is highly important to know whether or not there is disease-carrying property, or whether, if the water is foul, in odor and taste, this is due to the presence of algæ or similar organisms, or to sewage, and this question can only be properly determined by bacteriological examination. Progressive municipalities to-day are working on the assumption that all waters are more or less impure, and considerable study has been given to the subject of practical methods for general purification for the reason that, though a water may be pure to-day, from a chemical and bacteriological standpoint, it may be polluted to-morrow. In this connection chemistry plays an important part, and a knowledge of practical methods of purification would seem much more valuable to a military sanitarian than familiarity with analytical processes which, under the most favorable circumstances, are extremely laborious without compensating profit. The term pollution should properly be applied to a water which is

defiled, and, therefore, it would seem that the statement that "The term pollution is intended to convey the idea that there is evidence that animal products, such as urine, the soluble portions of feces, etc., have at some time, either recent or remote, entered the water" seems a misapplication and apt to give an erroneous impression. If oxidation and chemical activity have done their work completely, particularly when brought about by the action of nonpathogenic organisms, which is very often the case, it matters not whether the organic matter is of vegetable or animal origin. The ultimate products would be harmless as regards disease-carrying property, and the objection to the animal source of the products of oxidation would not be based on scientific grounds. The answer to this contention " * * * that it is now very generally acknowledged that even though the organic matter of a polluted water be thoroughly oxidized, there is just as much danger in drinking it as there would be in a water the pollution of which was of very recent origin and in which the organic matter is still in a fresh or unoxidized state," is a very unsatisfactory one. According to this method of reasoning a glass of water containing, say, a gram of potassium nitrate and some sodium chloride might be subject to deep suspicion, and all the work which has been and is now being done in the purification, by chemical means, of sewage effluents is condemned. It is not necessary to discuss the value of the individual determinations usually made in a routine analysis; that they are in themselves of little value has been clearly pointed out by the author of the article in the October Bulletin.

Furthermore it was shown that the "composite" of a given water when compared with a table purporting to give the safe limit of the substances usually determined, indicated the water to be pure; whereas, as a matter of fact, the water was polluted, as shown by the following quotation:

Water No. — is from a well 35 feet deep, situated in the midst of a rather populous district. Under such circumstances this water consists in part at least of the ground water of the said district, and will contain the elements derived from cesspools and stables and is, therefore, polluted and a water to be condemned. This was done on the result of the analysis alone, even though the quantity of any ingredient did not exceed that given in the composite standard. (Some time after this analysis was made the health department, acting on an analysis of its own, ordered the well to be closed.)

Just why this water was condemned on its chemical analysis is not quite clear. It is presumed that the opinion was based on the relationship that existed between the nitrogen and chlorine determination and the corresponding normals for the neighborhood in question. Possibly the health department made a bacteriological examination surreptitiously. Under any circumstance the result of the chemical examination could only form the basis of an opinion, it did not

establish proof. The final contention of the champions of chemical examination is that the quality of a water may be determined by chemical analysis when the "composite" of the water in question is compared with the local normals and the "composites" of the water of the same locality which are known to be pure. How has their purity been established? We venture the assertion that it was either by bacteriological examination or the more roundabout way of using the water without untoward effect. If the chances of enduring life for chemical analysis of water, in so far as its practical application by, and value to, a military medical officer is concerned, depends on this method of procedure, it hangs by a slender thread indeed. We grant that this method will arouse a suspicion, but it can never establish a certainty of pathogenic pollution. Chemistry has served well in the absence of better means, but bacteriology has largely supplanted it in establishing the potability of water.

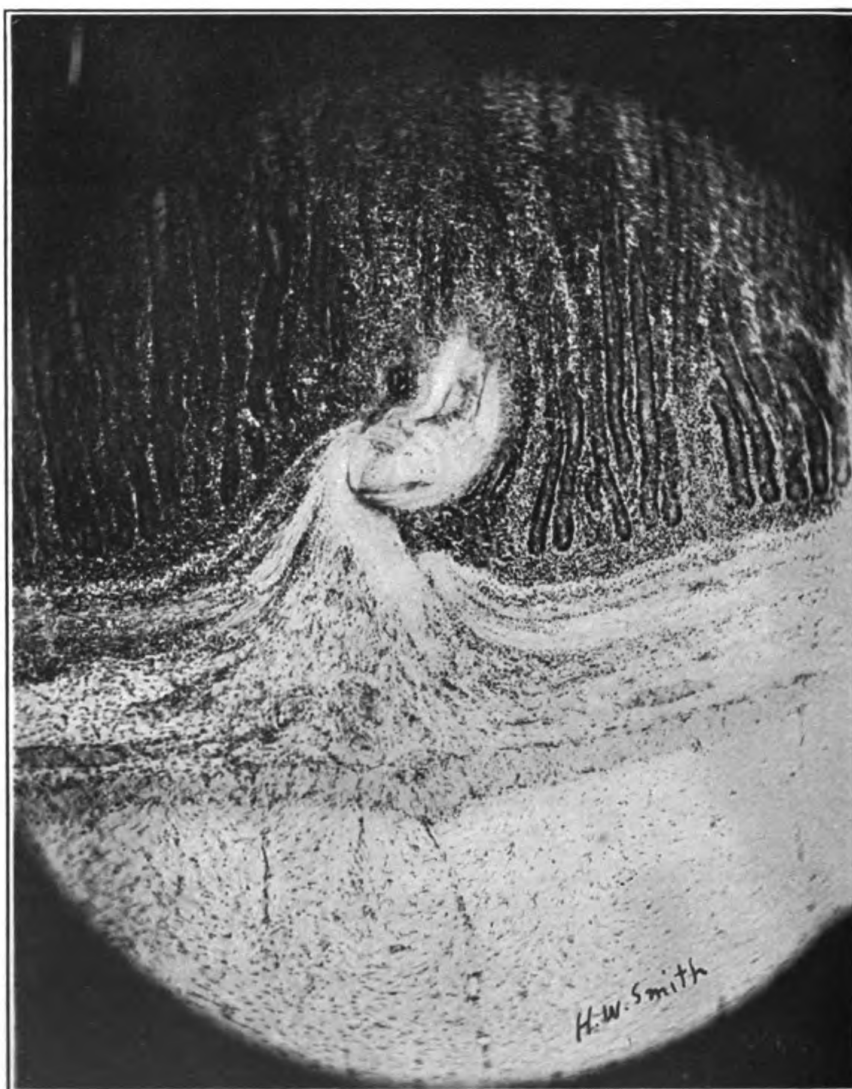
AN AID IN THROAT AND LARYNGEAL EXAMINATIONS.

By Passed Asst. Surg. E. M. BROWN, U. S. Navy.

Every examiner has frequently noted the difficulty encountered in depressing the tongue, and the absolute inability on the part of some patients to relax the tongue muscles.

This difficulty can always be obviated by telling the patient to yawn. This is a physiological action that is almost involuntary, and is accomplished without effort on the patient's part. It produces a natural depression of the tongue, for the reason that the desired result, namely, the inspiration of a large quantity of air in a very short interval of time, demands as large an orifice as possible.

Then, when once the patient has learned with what ease the tongue can be made to relax and follow the lower jaw when it is depressed, the very lightest pressure with the tongue depressor will present the largest field for observation obtainable, and the disagreeable gagging and throat strain, produced by powerful pressure so often necessary, will be dispensed with.



SHOWING HOOKWORM TO HAVE PENETRATED THE MUCOSA TO THE MUSCULARIS MUCOSA.

PROGRESS IN MEDICAL SCIENCES.

LABORATORY.

AN ANATOMICAL PECULIARITY NOTED IN SPECIMENS OF HOOKWORMS FROM CULEBRA.

Passed Asst. Surg. O. J. Mink, U. S. Navy, reports from the United States Naval Medical School that:

While examining a number of hookworms sent to the laboratory from Culebra, two specimens (a male and a female) proved to be of the old world type, *Anchylostoma duodenale*.

In the female the vaginal opening was distinctly in the anterior half of the body, being at the junction of the anterior and middle thirds of the worm. The vaginal opening in the new world type is normally in the posterior half of the body, and this exception to the rule concerning one of the points of differentiation of the two types of hookworm, although perhaps previously noted, is sufficiently rare to merit mention.

PRELIMINARY NOTE ON THE LESIONS OF ANCHYLOSTOMIASIS IN THE INTESTINES OF DOGS.

(From the laboratory of the United States Naval Medical School, Washington, D. C.)

Passed Asst. Surg. O. J. MINK, U. S. Navy.

During the past three months the intestines of a number of dogs from the District pound were examined.

The worms were all *Anchylostoma trigonocephalum*. Of the worms which were firmly fastened to the intestinal wall, the majority were females and were dark brown in color. The males were lighter in color and more frequently free in the intestinal contents. The worm passed through the mucosa to the muscularis mucosæ. The muscularis mucosæ and the underlying submucosa was drawn into the buccal capsule of the worm.

The fact: (1) That the worm apparently seeks the vascular submucosa; and (2) that all worms in this position contained a large amount of blood, would indicate that it is a blood-sucking parasite.

PRELIMINARY NOTE ON A NEMATODE FOUND IN THE LIVER OF A WILD RAT.

(From the laboratory of the United States Naval Medical School, Washington, D. C.)

Passed Asst. Surg. O. J. MINK, U. S. Navy.

This parasite has been found in seven rats during the past month.

The liver shows numerous irregular white spots varying in size from a pin head to a pea. On the surface of one liver was a bleb, from which was drawn portions of the worm from 1 to 3 inches in length. These fragments were about the size of a coarse thread and were filled with eggs. The eggs resembled those of the ordinary whipworm, but were larger and paler in color. Sections of the liver showed large masses of eggs, in all stages of development, surrounded by granulation tissue. The worm as shown in cross section in the tissue consisted of an outer wall, an intestine lined with a single layer of columnar cells and some portion of the genital tract filled with undeveloped eggs.

CHEMISTRY AND PHARMACY.

Asst. Surg. E. W. BROWN and Pharmacist P. J. WALDNER, U. S. Navy.

BERINGER, GEO. M., Jr. **Note on the disintegration of tablets.** Merk's Report, October, 1908.

A very interesting and valuable point regarding a method to aid disintegration of compressed tablets is brought out by the writer. He has found that the addition to the medicinal principal of a substance comparatively either more soluble or less soluble will markedly affect the breaking up process: the explanation being that the more readily soluble substance, be it the active ingredient or diluent, will first dissolve, producing a sort of "honeycombing" effect whereby cohesion of the particles is destroyed and greater surface exposed to the action of the solvent. The writer states that certain entirely proper additions will cause the tablet to "fairly fly to pieces" when dropped in water.—(P. J. W.)

WILEY, H. W., BIGELOW, W. D., WEBER, F. C., and others. **Influence of benzoic acid and benzoates on digestion and health.** Bulletin 84, Part IV, Bureau Chemistry, U. S. Department of Agriculture.

This is a continuation of studies previously reported with the food preservatives, boric acid, salicylic acid, and sulphur dioxide. These experiments have been of particular interest because of their relation to the question of the use of chemicals, even in very small quantities, for the preservation of food products. Twelve men were used for this investigation, benzoic acid being administered to six and sodium benzoate to six. The ingestion of the preservatives was continued

for twenty days and the amount given varied from 1 gram to 2.5 grams, being increased every five days by increments of 0.5 grams. Nine of the men became ill before the close of the experiments and only three were able to take the maximum dose of 2.5 grams. It is concluded that the administration of benzoic acid, either as such or in the form of benzoate of soda, is highly objectionable and produces a very serious disturbance of metabolic functions, attended with injury to digestion and health. Grave disturbances of digestion were evident, attended by phenomena which are clearly indicative of irritation, nausea, headache, and, in a few cases, vomiting. The symptoms were well marked and since the subjects were healthy individuals, living under sanitary conditions, it is concluded that more serious and lasting injury would be produced in the case of weaker systems or less resistant conditions of health. A distinct tendency was manifested to retain benzoic acid in the body for a considerable time. The occurrence of microscopic bodies in the urine is increased, thus showing the tendency of benzoic acid to stimulate the destructive activities of the body. In consideration of the data it is held that the interests of the public health demand that benzoic acid and benzoate of soda be excluded from food products.—(E. W. B.)

FOXWELL, D. Address on the clinical examination of urine with especial reference to the estimation of urea. *Lancet*, November 14, 1908.

The author discusses the physical, chemical, and microscopical examination of urine and emphasized the importance of considering deviations from normal conditions of the urine rather than putting special weight on the presence of abnormal constituents. In other words, he believes that the presence or absence of albumin is of comparatively little importance as indicating the presence or absence of nephritis, chronic or acute; that kidneys which have been injured but are now entirely healed may show in the urine traces of albumin which is not of the least significance. On the other hand, variations from the normal twenty-four-hour amount of water and variations from the normal amount of urea he believes to be the most important, if not the only important, points in a chemical examination. The percentage of urea and the specific gravity are the two important factors which indicate the degree of kidney damage. The presence of various kinds of cells as indicating lesions along definite parts of the urinary tract he thinks have no value. The importance of casts he believes is overestimated, and considers that it is analogous to the raising up of sputum, mucus, or pus from the bronchial tubes which shortly after become entirely healed. Tables and cases are presented showing the value of estimating the total amount of urea excreted.—(E. W. B.)

FULD AND LEVISON. Determination of pepsin by the edestin test. *Biochem. Zeitschr.* No. VI, pp. 473-501.

This method has attracted considerable attention recently and seems of very promising value. It is based upon the fact that edestin, a globulin-like protein, prepared from hemp seed, is easily digested with pepsin. The point at which the edestin has been completely transformed into a salt-soluble compound is taken as the end point. The method is as follows: The filtered test breakfast is diluted with 20 volumes of water. This placed in a series of test tubes (1 centimeter in diameter) in progressively decreasing amounts, preferably in fractions of 10. To each of these tubes is then quickly added 2 cubic centimeters of a 1:1,000 solution of edestin in water and the mixture well shaken. After thirty minutes a few crystals of sodium chloride are added to each of the tubes, commencing with the least dilute solution of the filtrate, and the mixture well shaken. The series is then examined in direct light against a black background; the tube which contains the weakest pepsin solution which does not show a trace of turbidity is taken for the calculation, which is as follows: The number of cubic centimeters of the original gastric juice which the test tube contains is divided into the product of the dilution and number of cubic centimeters of edestin solution added. The resultant figure indicates the number of strength units possessed by the juice. The authors have tested the method and find that it gives good results which are easily and quickly obtained at room temperature.—(E. W. B.)

SURGERY.

Surg. H. C. CURL and Passed Asst. Surg. H. W. SMITH, U. S. Navy.

REVIEW OF ADVANCES.

During the last few months some suggestive articles have appeared in relation to the treatment of fractures. Doctor Huntington, of San Francisco, after a personal correspondence with most of the best-known operators in the United States, published his ideas regarding fractures, telling us that our standard of results in fractures of the femur was too low, and advocating the open method, with fixation made absolute by the use of wire staples.

Following this came an article by Doctors Ashhurst and Newell, in November *Annals of Surgery*, defending the usual methods, and claiming that good results could be obtained in fractures of the femur without the more radical open method and mechanical fastening.

Next we see a revival of Doctor Championiere's mobilization methods described by himself in the most glowing terms.

All this leaves the ordinary medical man somewhat at sea as to what is the best treatment of fractures, and will doubtless have the

usual effect, depending upon "the reaction of the individual." The conservative man will continue in his accustomed methods, and the man with the experimental trend will try all the different methods, having high authority for each.

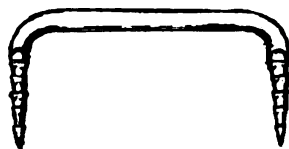
Another surgical subject which is being emphasized in the literature is the desirability of thorough enucleation of the tonsil by dissection, rather than its partial removal by the tonsillotome or snare. In some of our largest clinics a general anaesthetic is given as a routine, and the patient placed with head lowered, to prevent the swallowing of blood. The tonsil is grasped by forceps, with jaws bent at right angles to the shaft, and the dissection is begun behind. At least three forms of special knives are recommended, and with them a very complete separation from the pillars can be accomplished and the entire gland enucleated.

Another surgeon, Dr. F. S. Mathews, of New York, advocates the enucleation of the tonsil by the finger, and the method is, according to his account, the operation of all others to use in children and young adults. In many cases Doctor Mathews uses some instrument, such as a snare, blunt scissors, or tonsillotome, to separate the mucous connection at the lower base. A clean, very quick operation is claimed; it is applicable to nearly all conditions; is safer and better than those necessitating complicated instruments; and can be done with an anaesthesia lasting only a few minutes. Here again the operator is able to choose several methods, each having the sanction of men of ability.

ABSTRACTS.

HUNTINGTON, T. W. The operative treatment of recent fractures of the femoral shaft. *The Annals of Surgery*, September, 1908.

Doctor Huntington has recently secured the opinions of many American surgeons as to the best method of treating recent fractures of the shaft of the femur. He considers that our standard as to results is not high enough; that we are satisfied with results so indifferent that they would not be accepted in other classes of fractures.



W. Arbuthnot Lane's Staple

After showing the many well-known difficulties in treatment, he strongly advocates the open method and the fastening of the fragments, after replacing, by the "Lane staples." Mechanical traction

during operation is indispensable and under modern asepsis the open method is not to be feared. The X ray is almost indispensable in accurate diagnosis and to watch the results of the treatment.—(H. C. C.)

CHAMPIONNIERE, L. *The treatment of fractures by mobilization and massage.* British Medical Journal, October 3, 1908.

The writer begins by giving it as a time honored rule that fractures should be treated by: First. The return of fragments to their former place; and second, immobilization in that position.

As exactly opposed to this, he gives as his opinion that:

Absolute fixation of the fragments is not the most favorable condition for the phenomena necessary to repair at the site of a fracture. A certain amount of movement is the necessary condition.

The statement is made that massage removes the pain in fracture, that being due to laceration of soft parts, nerves, and ligaments, effusions of blood, and muscular irritability. Muscular spasm is relieved early.

Mobilization is done as follows: First. Slight and gradually increased passive motions to the joints remote from the fracture. They should be passive and distinctly limited. Second. After union has taken place the motions may be more ample (of adjacent joints) and active motion allowed, but always through very short range.

The treatment should not cause pain, and pain produced indicates that the treatment is not being properly given. Massage of the soft parts and fragments is to be done daily. In fracture of the hand the motion and massage should be extended to the shoulder joint; in fractures of the foot, to the hip joint.

Doctor Championniere has used this treatment for twenty-five years with great success. He uses immobilization in a few cases for the first few days, and admits the need of suture in fractured patella; otherwise all cases are treated as described, and the claim is made that he gets quicker, better union, with fewer complications, than by the usual method.—(H. C. C.)

VALE, F. P. *Has surgical treatment lessened mortality from appendicitis?* "Fisk Fund Prize Dissertation," published as Monograph, 1908.

The essay is the one awarded the Fisk prize in May, 1908, after competition. The author has apparently studied the statistics of appendicitis most thoroughly and his deductions are as follows:

My own conclusion is that with the inauguration of the present operative era in the treatment of appendicitis the fatality of the disease was increased before

1900, and later subsided to about its point of departure—that is, when the sum totals are considered. The success of any one operator points to what all may hope to accomplish, but such final and general success in the surgical treatment of appendicitis will have to be chronicled by some future essay.

The above deductions are rather startling, but can be analyzed as follows: When the operation of appendicectomy first began to be “popularized,” a large number of medical men, not in the least capable of skillful surgical work, and not familiar with abdominal technique, began to operate. They temporized, and delays, such as no well qualified man would now permit, were common; the operation was often done when too much time had been sacrificed in making a diagnosis and when the patient was in a bad condition.

Another important phase of this question is, that medical men not in favor of operative interference in appendicitis referred only their severe or hopeless cases to the surgeon after exhausting medical treatment. These things naturally raised the percentage of deaths.

Then we must remember that with all regard for statistics there must be many cases in the list of those treated by nonoperative measures and reported as cured which came to operation during a subsequent and more severe attack.

I fully believe that with the advances now being made in the diagnosis of appendicitis and the technique of appendicectomy, even our statisticians will admit not only equal results, but very much better results from surgical than from medical treatment of the disease.

The fact that many operators are getting results far better than the best medical series seems to “point the way.”—(H. C. C.)

BRUSH, E. C. When to operate for appendicitis. Ohio Medical Journal, September, 1908.

Again going back to the question propounded, “When to operate?” it would certainly be safe to answer:

First. Operate at the onset of the disease, if possible.

Second. If not seen at the onset and it is evident that a pus cavity is being walled off, watch and wait for the proper time to open. After opening, be guided by the conditions found as to any further operative work at that time.

Third. If evidence of pus and general infection exists, open, drain, and wait, even if local or general peritonitis, nothing can be lost by opening and drainage.

Fourth. If, when first seen, the patient is recovering from an attack, let him recover, and then operate before he can have another attack.

The foregoing answers are based on the symptoms objective and subjective as have been found in everyday work.—(H. C. C.)

FOWLER, R. H. Diffuse septic peritonitis, due to appendicitis—with reference to after treatment with postural drainage. *Annals of Surgery*, December, 1908.

This paper is an analysis of cases operated upon at St. Luke's Hospital, New York, from 1898 to 1908, and cites in detail the treatment employed. Prior to 1900 postural drainage was not used; since then it has been quite generally adopted, practically all cases being so treated during the last few years.

Prior to 1900, 93.3 per cent of the cases died; since 1900, 62.9 per cent of the cases died. A careful analysis, however, from year to year shows an important fact which modifies our first deductions. It is that early operation is of the greatest importance, more important, in fact, than many of the mechanical improvements. In brief, statistics show that the best results in septic peritonitis are secured by: (1) Early operation through small incision, dealing quickly with the primary focus, and avoiding evisceration; (2) postural drainage, with Murphy proctoclysis and Ochsner's treatment. Postural drainage means elevation of the shoulders by some such means as a double incline covered with a mattress, and it is astonishing how well cases of a very serious nature do under the above treatment.—(H. C. C.)

BIER, AUGUST. Local anæsthesia of a limb by venous transfusion after expulsion of blood. *Arch. f. klinische Chirurgie*, Berlin. LXXXVIII, No. 4.

This method, described in Bier's second communication, makes possible extensive operations on the limbs, such as resection of the knee or elbow, under local anæsthesia. A large amount of anæsthetizing solution is injected into the venous system above the field of operation; the drug apparently diffuses readily and reaches the nerve terminations. The method is as follows:

The blood is entirely expelled from the limb by an elastic bandage applied centripetally. Above the field of operation is placed a constricting tourniquet preferably consisting of many turns of a rubber bandage. A similar bandage is located below operative area. A subcutaneous vein is then opened and the anæsthetic injected. Bier uses 40 to 80 cubic centimeters of a 0.5 per cent solution of Novocain in isotonic salt solution. Anæsthesia is complete in two to fifteen minutes. Much of the anæsthetic escapes through the operative wound; just before suturing the peripheral tourniquet may be removed and the central tourniquet loosened sufficiently to permit the ingress of arterial blood, i. e., until the limb becomes pink; this promotes further elimination of the drug via the wound. In case large quantities of the anæsthetic have been employed, salt solution may be used to wash out the veins, the solution also escaping by the wound. The anæsthetic which remains seems fixed in the tissues and absorption is not dangerously rapid.—(H. W. S.)

ZUR VERTH, DOCTOR—Marine-Stabsarzt. **On narcosis under an artificially restricted circulation.** (From the Royal University Surgical Clinic and Polyclinic, Berlin, Prof. Dr. Bier.) *Münchener Med. Wochenschrift* No. 46, 1908.

Doctor zur Verth, well known for his previous work on anæsthesia, communicates the results of his observations in 100 cases of ether anæsthesia with eliminations from the general circulation of the lower extremities by means of Esmarch's tourniquet.

The advantages in the employment of the method are that the amount of the narcotic to be employed in the ordinary method of general anæsthesia can be materially diminished and the less poisonous ether rather than the customary chloroform employed, even without the administration of skopolamine-morphine, which in itself means an additional poison for the organism.

Another advantage is the quick recovery that follows the removal of the rubber tourniquet and which is undoubtedly due to the small amount of the narcotic that was used in bringing about the general anæsthesia.

The last and most essential advantage claimed for the method is that the blood, temporarily confined in the lower extremities and surcharged with carbonic acid, when readmitted into the general circulation, has a strongly stimulating effect on the respiratory center, very much in need of such a stimulus, because it is in a state of depression—not on account of a lack in oxygen, but on account of the depressing effect of the narcotic, especially when chloroform was used.

The constriction about the lower extremities must be such as to completely arrest the circulation, so that the confined blood may remain free from the narcotic. Esmarch's tourniquets are sufficient. The arms were not excluded from the general circulation. No harmful effects were noted in the 100 cases in which this method of anæsthesia was employed.—*Medical Inspector H. G. Beyer.*

EPPINGER, H., FALTA, W., AND RUDINGER, C. **The correlation of glands with internal secretions.** *Zeitschrift f. klin. Med.* Bd. 66, Heft 1 and 2.

The authors have drawn from a series of animal experiments many new facts bearing on the interrelations of the pancreas, thyroid, and adrenal glands of more than academic interest to the surgeon, and they embody their results in the following theory.

The pancreas and the thyroid are reciprocally inhibiting, as likewise are the pancreas and the adrenal medulla. The thyroid and the adrenal, however, are mutually stimulating. The effect of the removal or loss of function of any one of these three glands will consist of two factors—the one direct and owing to the lack of internal

secretion to the economy, the other indirect, depending on changes in the activities of the two other glands permitted by the absence of the secretion of the one. Thus after extirpation of the thyroid the pancreas will show increased activity, while the adrenal will exhibit depressed function. Interesting metabolism experiments bear out the authors' assumptions.—(H. W. S.)

ELLERMAN AND ERLANDSEN. Improved technique for the detection of tubercle bacilli in the urine. *Hospitalstidende*, Copenhagen, July 23, No. 30, p. 873.

1. Draw urine with a catheter. Allow to settle and decant supernatant fluid.
2. Of the residue centrifugalize 10 to 15 centimeters after heating to dissolve urates.
3. Decant supernatant liquid and to the residue add four times its volume of 0.25 per cent sodium carbonate.
4. Incubate twenty-four hours at 37° C. If reaction is still acid, add more carbonate and incubate some hours.
5. Decant supernatant fluid and centrifugalize.
6. Add to sediment four times its volume of 0.25 per cent NaOH; stir until dissolved; bring to a boil; let cool.
7. Centrifuge; examine sediment microscopically.

This method is said to furnish almost absolute proof as to the presence or absence of tubercle bacilli.

NOTE.—In view of the fact that there seems to be no reliable staining method of differentiating tubercle and smegma bacilli, great care should be observed in washing penis (or vulva) and in irrigating the urethra thoroughly as far as the membranous portion before introducing catheter.—(H. W. S.)

CARBONEL, DOCTOR—*Médecin de 1^{re} classe de la marine. Secours aux blessés, pendant le combat (Relief of wounded during battle).* *Arch. de Médecine Navale*, November, 1908, No. 11, p. 334.

The paper is an abstract from a report on the subject of "Aids to the wounded," during battle on board the protected cruiser *Condé*, by Doctor Carbonel.

It seems that at first this vessel had not been supplied with either an efficient dressing station or with a very orderly first-aid station. After some changes had been made, and at the time this report was made, the place for the wounded is spoken of as—large, in good working order, accessible from all points of the vessel, and provided with all the fittings that are necessary and desirable.

For receiving or simply passing the wounded during battle there is available:

1. A principal station with a special passage.
2. A secondary station with a special passage.
3. An annex to the principal station.
4. A relay station for first-aid, forward.
5. A relay station for first-aid, aft.

1. The principal station (our dressing station). This is located entirely within armor protection, in a space called the "entrepont cellulaire," a deck located between the two steel decks and inclosed by armor fore and aft and on both sides; the space, in fact, is the old converted torpedo room, large and commodious, communicating with the general magazine on the one hand and the deck on the other. In the middle line, from fore to aft, it is crossed by the foot of the conning tower and mizzenmast; in each corner, aft, of the trapezoidal floor space, there is an ammunition hoist; between these two there are drawers for dressings. In the forward port corner there is the disinfection oven.

In times of peace this compartment serves as a place of confinement. To this end a large camp bed has been constructed on either side, with the head end against the side of the ship and the foot end supported by movable supports. These could be quickly changed in time of war and converted into places for berthing the wounded. Hooks are provided for either hammocks or swinging beds.

Operating room: On the starboard side forward, limited by the thwartships armor forward, by the side armor on the right, and by the foot of the conning tower on the left, there is a relatively large space which is used as the operating room; the operating table, solidly fixed to the deck, occupies the middle of this space. The walls of the conning tower are provided with several shelves for dressings within easy reach of the operator. Against the transverse armor, wash basins with water supply spigots have been put up; one for distilled water, another for fresh water, and a third for salt water. Arrangements for heating distilled water are also provided close by. A large receptacle is also at hand for dirty water, which is discharged into the bilge. On the other side of the operating table there is a table for dressings; this table has several shelves, one above the other; the table can be used for bottles containing antiseptic solutions. Between the two ammunition hoists aft there is a large vacant space which is reserved for broad shelves, upon which bedding may be kept. A speaking tube permits of communication with the conning tower.

The lighting is by electricity and by an ingenious arrangement the lamps can be moved fore and aft as well as up and down, so as to enable the operator to direct the light upon any part of the patient

desired, without its being in the way of either the operator or his assistants.

Ventilation is assured: (1) By the hatch which communicates with the deck above; and (2) by a supply ventilator, taking fresh air from above decks near one of the bridges and driving it by a fan into the room. In this manner perfect comfort is obtained. The temperature, taken during March, while the ship was on the African coast and at anchor was 22° C. With the ventilator in operation it will, of course, be considerably lower.

Carbonel counts upon housing 19 wounded without taking away the ladder leading to the deck above, and 29 when that ladder is removed, without in the least interfering with the hammock bed of Auffret.

This new "poste" has, then, many advantages over the old one; it is described as large and well ventilated, well provided and leaving the operator entirely undisturbed during action. The place is accessible without difficulty, continuous with the annex, where the patients are treated, in constant communication with the relief station on the same deck, so as to enable the surgeon to direct the entire service when time permits. Being in communication by a speaking tube with the commandant, the surgeon may receive and execute his orders as well as hear every signal given on the decks above.

The armored deck above appears to form a perfect and sufficient protection, when it is considered that the *Orel*, after being captured by the Japanese at the battle of Tsushima, had been placed "hors de combat" by 34 projectiles without having its steel deck pierced even in its weakest parts.

The annex (poste annexe) is the forward part of the general magazine, communicating with the station by a door in the transverse armor. Four men can be easily berthed there.

Relief station (poste secondaire). As is the dressing and operating station, so is the relief station located within armor protection and on the same deck. It occupies the port side of the vessel and corresponds with the fireroom space below. Forward of the water-tight partition, against the armorers' storeroom, a station with dressings has been put up. There, also, can be had a supply of sea water, of fresh water, and of hot and cold distilled water.

The two water tanks, one of which is provided with heating arrangements, and which were located in the annex, where they were of no use, were moved to this place and fixed to the water-tight partition, above a basin near the dressing table. Large chests with dressings are stored here also. Lighting is supplied by four fixed and two movable lamps. Ventilation is effected by the hatch for lowering the wounded and the forward and after engine room hatches.

This station, which is in constant communication with the operating station, could accommodate 30 wounded without inconvenience.

Divided between the different stations, 56 men at least could be accommodated on this vessel.

Passages. There is one forward and one aft. (1) The forward passage, giving access to the operating station (*poste principale*), begins abaft the lower bridge above and terminates on the lower steel deck, about 9 feet abaft the water-tight partition. In ordinary times there are two ladders crossing each other; during action one is removed, so as to leave the entire forward half free. Auffret's hammock or a chair, sliding in four steel wires, extending from the upper hatch to the steel deck below, is maneuvered by tackle and pulley. Although this passage is at all times of easy access, it permits but one man being lowered at a time. (2) The after passage. This consists of the after half of the officers' ladders and extends from the upper deck to the lower steel deck, straight to the relief station, being provided as the first.

Relay or first-aid stations. These are stations situated at points relatively protected, where the slightly wounded may be attended to or where the seriously wounded may receive immediate care, if necessary, while waiting for transport to the dressing stations. There are two such relay stations: One is situated on the main deck, between two casemates, abaft the forward transverse armor; the other on the gun deck, between two casemates, forward of the transverse armor. The exposed side of the deck will be protected by hammocks slung lengthwise from the deck above. There also will be provided, in case of an action, ready-made dressings, water, stretchers, and hammocks (*Guezennec's*) to each of these first-aid stations.

The personnel consists of: (1) One surgeon; (2) one paymaster; (3) one first-class bayman; (4) one second-class bayman; (5) litter carriers; (6) ambulance men.

Before the battle: Under the directions of the surgeon, seamen equip the different postes and stations with the necessary material, in which duties they have been exercised during the different peace maneuvers. Small boxes containing a definite number of dressings, and properly labeled, are distributed between the different turrets and casemates. Small vessels with water are also placed in the casemates to quench the thirst of the combatants. On every bridge a *Guezennec* hammock provided with tackle is placed; by order of the commanding officer every man must take a bath and put on clean clothes. Finally, the surgeon, after having assured himself that his orders have been properly executed, that the water reservoirs are filled, that the electric lamps are in working order, briefly gives his

final instructions to every one of his assistants and goes to his station (poste principale).

During the battle: The surgeon, the paymaster, one of the baymen and two ambulance men stay in the operating room (poste principale); the first-class bayman and one ambulance man proceed to the relief station (poste secondaire); one ambulance man goes to each of the first-aid stations, ready and prepared to give first aid to the wounded.

The assembling of the wounded: With this duty an administration officer is charged, the commanding officer being of the opinion that the medical officer has quite enough to do where he is. Nevertheless, the paymaster will inform the surgeon whenever there happens to occur some serious injury.

The paymaster has charge:

1. Of the reserve squad and of the fire division,
2. Of men in reserve, torpedo men, and others,
3. Of men on detached service, litter bearers, etc.,
4. Material for transport of the wounded: Two splint stretchers of Auffret, 3 army stretchers, 6 frames, 12 hammocks (Guezennec), 2 chairs (fauteuil-cadre).

Fauteuil cadre: Upon a large frame 178 by 63 centimeters and at a point 53 centimeters from the end of one of its long sides, there is fixed by a couple of hinges a smaller frame, intended to serve as a back or pillow; its degree of inclination is regulated by a screw; both frames are covered with sailcloth.

Upon the larger of the two frames we have: (1) A small iron plate, concave above, and binding the two long sides about the middle; (2) on each of the two crosspieces there are two hooks, permitting the frame to be fixed to the hatch combing; (3) two rings, near the ends of each of the two long sides, intended for the introduction of wires to serve as guides. The means of suspension are the same as those for the splint stretchers of Auffret. Two of these frames were made on board on account of the fact that a requisition for four of Auffrets stretchers was disapproved.

It is left to the judgment of the paymaster whether, under the prevailing circumstances of the battle, the wounded be lowered or left at the first-aid stations.

At a prearranged signal the transport men repair to their respective stations to gather up the injured, after providing themselves with frames, stretchers, hammocks. Some go to the upper deck and the bridges; others go to the main and gun decks. The paymaster, according to circumstances, may also direct them to go elsewhere. The principle invariably followed is that every wounded man must be immediately bandaged; bandages are to be applied dry; patients are moved as soon as circumstances will permit. Those in command of

sections have received the necessary instruction for applying the required dressings.

Carriers of the wounded. In accordance with a departmental regulation the commanding officer has fixed their number on the *Condé*, at 42—that is, 7 per cent of the complement, including officers. Most of these men come from the light artillery, and neither cooks nor civilians are employed for this service. All these men are to be instructed by the surgeon, assisted by the chief bayman.

Ambulance men. The commanding officer, deeming it possible to utilize civilian employees as well as cooks for dressers, has caused them to be instructed in such duties and called them ambulance men. These men are stationed at first-aid stations (*postes relais*), at relief stations (*postes secondaire*). They will also take their places at the hatches to assist in lowering the wounded in their respective stretchers.—*Medical Inspector H. G. Beyer.*

PATHOLOGY AND BACTERIOLOGY.

Passed Asst. Surgs. C. S. BUTLER and O. J. MINK, U. S. Navy.

WHITE, C. P. On the so-called fatty degeneration of the adrenals. *Journal of Pathology and Bacteriology*, July, 1908.

The author calls attention to the constant presence of fatty substances principally in the cortex and deposited in adrenal cells showing no other signs of degeneration. These fats are in a crystalline condition and are believed to be combinations of cholesterin with lecithin, fatty acids and alcohol and occasionally ordinary fats.

He summarizes his opinions as follows:

1. The presence of fats and lipoids in the adrenal cortex is a physiological condition.
2. The adrenal cortex is engaged in the secretion of cholesterin, lecithin and fats.
3. This secretion has some connection with regulation of growth and development.—(O. J. M.)

NICHOLSON, G. W. (Gall Research Student). Three cases of squamous celled carcinoma of the gall bladder. *Journal of Pathology and Bacteriology*, July, 1908.

The author calls attention to recent reports of squamous celled carcinomata arising in mucous membranes and glands lined by columnar and cubical epithelium. Among these rare tumors he mentions epitheliomata of the bronchi, stomach, intestines, gall bladder, pancreas, uterus, and prostate.

He gives the clinical histories and pathologic findings in his three cases of gall-bladder epitheliomata. All the cases were associated

with gall stones and showed adhesions to surrounding organs. In one case the liver and rectum were invaded by the growth, and in another the liver, suspensory ligament, and under surface of the diaphragm showed invasion.

Briefly, the pathologic histology was that of an epitheliomata, columns of cells, from the columnar to the squamous type, often showing true horny change, being embedded in a connective tissue stroma. The metastasis, except that in the rectum, which was not examined, showed the same epitheliomatous character.

In explaining the condition, the author considers several theories:

1. Spread of the squamous epithelium from a neighboring surface normally lined by it.
2. A displaced rudiment, possibly derived from the skin or œsophagus.
3. Metaplasia.

The author prefers the last theory.

The primitive foregut, from the lower part of which the bile and pancreatic ducts bud, is lined by indifferent ciliated cells which have the power of becoming squamous or columnar.

The œsophagus, being subject normally to greatest amount of violence, takes the tough squamous epithelium. However, Futterer was able to produce squamous epithelium in the pyloric end of the stomach of rabbits by long-continued irritation. Similarly, if the gall bladder is continually irritated, its epithelium may assume the resistant squamous type, in order to protect its deeper parts.

The author also believes that the metaplasia is the result of the growth of young cells which are normally used in repairing the wear and tear of the part rather than a direct change of the adult columnar epithelium.—(O. J. M.)

GERACHTY, J. T., M. D. (Instructor, The Johns Hopkins University). **The practical value of the demonstration of *Spirochæta pallida* in the early diagnosis of syphilis.** Johns Hopkins Hospital Bulletin, December, 1908, p. 364.

Experience, both past and present, has shown that those cases of syphilis in which an early diagnosis can be made from the primary sore and in which treatment is begun before the appearance of secondary lesions generally run a mild course and, according to Fournier, are much less liable to tertiary accidents. In the Johns Hopkins Hospital genito-urinary clinic smears are made from all venereal sores as a matter of routine, and whenever the *S. pallida*^a is found specific treatment is begun at once. The routine examination of all venereal sores reported, in all about 150 cases, showed 30 of them to be syphilitic. In these 30 cases *S. pallida* was found in 27 cases.

The difficulty is in getting good smears, and this requires a good technique. The sore is well cleaned with soap and water and the

^a Now called *Treponema pallida*.

surface is rubbed with a piece of gauze until small bleeding points appear. The sore is now compressed between the thumb and forefinger. This firm pressure causes at first quite an ooze of blood, but if pressure is kept up, an almost clear serum will soon exude. A clean slide is then rapidly swept across the exuding serum, from 3 to 4 smears being made from each sore. By first cleaning the surface we get rid of the *S. refringens*, which is a surface grower, while the *S. pallida* is most apt to be obtained from the deeper serum squeezed out of the living tissue. The same technique applies to condylomata and mucous patches on the lips. In obtaining smears from skin lesions, the superficial epithelium should be scraped off with a knife blade until small bleeding points are visible; the serum is then squeezed from the abraded surface and the smears made.

Method of staining: Giemsa's stain was employed at first, but abandoned for Hasting's. The slides after being air dried are covered completely with this stain. After one minute distilled water is added until a metallic film forms and the smears are allowed to stain five minutes, washed in running water, and dried. The *S. pallida* is stained a faint blue, while the *S. refringens* shows a deep-blue stain. Silver methods were tried but not found satisfactory.

Differential characteristics: *S. pallida* is extremely slender, of uniform caliber, except the ends, which taper to an almost invisible point. *S. refringens* is much thicker. The spirals vary from 4 to 20, or even more, and the length of each spiral is about half the length of the spiral of the *S. refringens*. If the length of the spiral is 2 microns or over it is never a *S. pallida*. The spirals are rather angular, gradually diminishing from center toward the ends. The spirals of *S. refringens* are more wool like; they are neither so uniform nor so numerous and not so close set as are the spirals of *S. pallida*. The *S. refringens* is readily stained by ordinary dyes.—*Medical Inspector H. G. Beyer.*

MEDICAL ZOOLOGY.

Surg. R. C. HOLCOMB, U. S. Navy.

PLAGUE IN GROUND SQUIRRELS: A REVIEW.

Plague on the Pacific Coast. Journal of American Medical Association. Dec. 14, 1907, p. 2000.

Plague in Ground Squirrels. Public Health Reports, Sept. 11, 1908. Vol. 23, No. 37, p. 1298.

WHERRY, W. B. **Plague among Ground Squirrels of California.** The Journal of Infectious Diseases. Vol. 5, No. 5. Dec. 18, 1908, p. 485.

MCCOY, GEORGE W. (Passed Asst. Surg. P. H. & M. H. S.). **Biting of Man by Squirrel Fleas.** Public Health Reports, Nov. 27, 1908, p. 1719.

Under the above title Passed Assistant Surgeon Blue transmits a full bacteriological report by Passed Asst. Surg. Geo. W. McCoy on

the plague-infected squirrel of Contra Costa and other coast counties. Doctor Blue has repeatedly called attention to the fact that the native ground squirrel was probably very susceptible to pest, and that furthermore it was strongly probable that the squirrels of Contra Costa, Alameda, and probably other counties about the bay, had become infected and were spreading the disease. It was noted that the squirrels, especially of Contra Costa County, were rapidly dying off from some undetermined form of epizootic. As time passed, cases unquestionably originating in these surrounding counties were noted, and in almost every instance there was pretty direct connection with squirrels. One of the early cases observed by Doctor Blue in April, 1906, and which he reported at a meeting of the California Academy of Medicine for November, 1907, is here given to illustrate the relation of the squirrel to plague. The case occurred in a lad who lived in Oakland and frequently went out into the hills back of the town hunting squirrels. On such an expedition, in April, he shot two squirrels, which he had to drag out of their holes, as the squirrel always goes into his hole to die. One of the animals is reported to have bitten him. He took them, skinned them, and ate them. Within forty-eight hours he had a well-marked case of plague, with nearly complete glandular involvement. Some time previously efforts had been made to secure squirrels for examination, but all the dead ones brought in were too far decomposed to be of any value for this purpose.

Several other cases have occurred in boys or men who have shot and handled squirrels. One of the latest cases of this character has been reported by Surgeon Brooks, from Los Angeles. He reports a boy bitten in the finger by a ground squirrel August 5 or 6, 1908, sickened August 11, was seen by a physician August 12, and was reported to the local health officer in Los Angeles as suspicious. The boy resided at Buena Vista Park. Though the squirrel was destroyed by a dog and a cat August 21, a search of the premises near by resulted in the discovery of another dead squirrel. Material taken from one of the buboes of the boy presented the bacteriological evidence of plague, and the squirrel above referred to found dead in the park at Los Angeles also presented positive evidence of plague.

The work of Wherry in the Oakland laboratory, reported August 24, 1908, and of McCoy, reported August 27, 1908, is perhaps the first demonstration of the occurrence in nature of bubonic plague in the ground squirrel (*Citellus beecheyi*)^a of California, and there is no further doubt that these rodents are an important factor in the dissemination of plague.

^a The name *Citellus beecheyi* is that given in the Public Health Reports. The name used in Wherry's report is the *Otospermophilus beecheyi* (Richardson).

A case of plague occurred on the Faria ranch in the northern part of Contra Costa County July 11, 1908. An infected ground squirrel was obtained August 5, 1908. The tissue presented for Doctor McCoy's examination on August 6 was a piece of lung of the squirrel. Smear preparations showed the presence of organisms, which, stained with 1 per cent carbol thionin, were morphologically characteristic of plague bacillus. None of the organisms retained the stain when treated by Gram's method. Cultures were then made on or in agar, broth, salt agar, litmus milk, gelatin, glucose broth and lactose broth, with characteristic growth or reaction. Animal inoculations were then made using guinea pigs, brown rats (*Mus norvegicus*), and black rats (*Mus rattus*). In these animals typical lesions of plague developed and a pure culture of *Bacillus pestis* was isolated from organs examined. Rats and guinea pigs were also inoculated, being given injections of antipest serum. Those not protected by the serum sickened and died, those given the antipest serum remained well, and from the lesions of the animals dying the *Bacillus pestis* was recovered in each case.

Wherry in his report of his studies independent of Doctor McCoy, by a series of animal inoculations and cultural studies, found undisputable evidence of plague in this rodent found on the Faria ranch. He also mentions three other instances where he was able to demonstrate plague bacteriologically in ground squirrels found dead or shot in Contra Costa County.

Doctor McCoy by a series of experiments with fleas taken from the common California ground squirrel (*Citellus beecheyi*) found that they would bite man under experimental conditions. In the first experiment 30 fleas of *Ceratophyllus acutus* were used, 2 of which fed off man within one hour after collection. Of 12 starved for six days, 9 fed. In another experiment with specimens of *Hoplopyllus anomalous*, 4 female specimens fed well after being starved for four days.

GARRISON, PHILIP E. (Assistant Surgeon U. S. Navy, medical zoologist to biological laboratory, the Bureau of Science, Manila, P. I.) **The prevalence and distribution of the animal parasites of man in the Philippine Islands, with a consideration of their possible influence upon the public health.** The Philippine Journal of Science, "B. Medical Sciences." Vol. 3, No. 3, July, 1908, p. 191.

Garrison reports the result of his work at Bilibid Prison, which included the examination of the feces of 4,106 persons. Of this number he found the largest infection to be that of whipworm (*trichuris*). He found 2,426 infections of this worm, or 59 per cent, hook worms came next with 2,135 infections, or 52 per cent. Eel worms (*Ascaris*) were found in 1,052 infections, or 26 per cent.

Amœbæ in 926 infections, or 23 per cent. Other intestinal protozoa (ciliates and flagellates) in 853 infections, or 21 per cent. Pin worms (*Oxyuris*) in 32 infections, or 0.8 per cent. *Tæniæ* in 30 infections, or 0.7 per cent. Japanese lung flukes (*Paragonimus*) in 18 infections, or 0.4 per cent. Japanese blood flukes (*Schistosoma*) in 16 infections, or 0.4 per cent. Japanese liver flukes (*Opisthorchis*) in 11 infections, or 0.3 per cent. The dwarf tapeworm (*Hymenolepsis*) in 5 infections, or 0.1 per cent. Of the 4,106 persons examined, 3,447, or 84 per cent, were found to be infected with some one of the above parasites. In these 3,447 persons, 7,636 infections were found, the average individual harboring 2.25 infections. All of the parasites were found to have a fairly even geographic distribution, with the exception of *Paragonimus*, *Schistosoma*, and *Opisthorchis*. The two former appeared to originate almost exclusively in certain southern islands.—(R. C. H.)

ROBERTSON, ALEXANDER, M. B., C. M. Preliminary note on a protozoan in yaws. *Journal of Tropical Medicine and Hygiene*, November 2, 1908, p. 321.

Robertson describes a protozoan-like body which he found quite constantly in examining films prepared from precipitates obtained by centrifugalizing sterilized water in which flies, infesting yaw houses in Tarawa Hospital, and which had come in contact with the papules on the bodies of the patients, had been washed for 24 hours.

The bodies are described as irregularly round or oval, surrounded with a delicate investing membrane. The cytoplasm was composed of fine granules interspersed in a network of fine fibrils. There were two or more round or oval nuclei containing nucleoli as well as vacuoles and refractile bodies. In nearly all the unruptured bodies were to be found spirilla and chain-like bodies.

Robertson suggests that these protozoan-like bodies may be parent bodies of the spirochaetes.—(R. C. H.)

BENSEN, DR. W.—Marinestabsarzt. Die Darmprotozoen des Menschen. (The intestinal protozoa of man.) *Arch. f. Schiffs and Tropen Hygiene*, 1908, Bd. XII, Heft 20., p. 661.

In this paper the author gives us a brief and very concise review of the results of the most recent work on intestinal protozoa, including his own. On account of the great uncertainty which still exists in the minds of even some of the most scientific writers with regard to the amœbæ, as etiological factors of dysentery, a brief extract of that part of his paper can not fail to be of great interest.

So far as the amœbæ are concerned, the author very correctly states that it is no longer sufficient for us to be content simply with finding

that they are present in the stools, but that we must further ascertain to which one of the three varieties of amœbæ they belong. The principal differences among the amœbæ must be looked for in the differences of the reactions to staining agents of their ecto- and endoplasm and of the nuclear structure which they present.

Considering, first, the harmless *Entamœba coli* Loesch-Schaudinn: In this, in the living and quiescent state, no differences between ecto- and endoplasm can be observed, and only very indistinctly in the pseudopodia, the entire amœbæ refracting the light feebly and uniformly, while its nucleus is generally easily seen and recognized by its abundant content of chromatin and its rather tough membrane.

In the stained preparation the nucleus is usually round, contains a large karyosom and shows collections of chromatin near its membrane. In one of the cycles of development—of which there are several—the chromatin of the nucleus divides into eight parts, the nuclear membrane becomes dissolved, the particles of chromatin are scattered throughout the plasma, forming eight daughter-nuclei and the division into eight young amœba completes the process called schizogony.

Another mode of multiplication occurs by simple division, either amitotically or through a primitive mitosis. But along with these forms of multiplication another form is seen to occur within cysts. While most other amœbæ die during the process of the drying of the fæces, others, after expelling all foreign materials and becoming rounded, develop a cystic membrane. Their nucleus then divides, through mitosis, into two daughter-nuclei, which, as they draw away from each other, leave a lenticular space between them. Thus, the contents of the nuclear cyst are imperfectly divided into two parts (gametes). The nuclei of each part now begin to give off chromatic substance in the form of chromidia to the surrounding substance, whereupon the nuclear residue is either absorbed or expelled from the cyst. These generative chromidia now produce two new nuclei, which in their turn disappear, forming two reduction nuclei, which again break up.

In this stage of development the internal nuclear wall becomes firm, the lenticular space disappears, each one of the two nuclei divides by mitosis and, after a mutual interchange of substances going on between the male and female portions of the spindle, two fertilized nuclei or synkaria result. A double fertilization has occurred, an autogamy.

Within the cyst now a further division takes place, until eight nuclei have formed, a number which is characteristic of *Entamœba coli*. Such cysts, after finding their way into cats or man, burst in the upper parts of the large intestine, discharging eight young amœbæ. This process is known as sporogony.

Very different from the above variety behaves that known as *Entamoeba histolytica* Schaudinn, the etiological factor in ulcerative tropical dysentery, occurring chiefly in Asia, India, Egypt, and some other tropical countries. In this variety of amoeba, a distinct difference between ecto- and endoplasm may be noticed. The ectoplasm is hyaline, refracting light very strongly, while the endoplasm is granular and rich in vacuoles. During life, it is difficult to recognize the nucleus, on account of its small chromatin content and the absence of a nuclear membrane. In the stained preparation, it appears frequently flattened, has a very small nucleolus with the chromatin forming a very fine layer near the periphery of the nucleus.

Toward the end of an attack of dysentery, supposing the process to terminate in recovery, certain enduration forms are found in the thickened stools. These are very small, measuring from 3 to 7 micra, possessing a brownish yellow membrane with a double contour and showing no special structure in their interior arising by a process of budding from the peripheral surface of the larger individuals. Before such buds are formed, the nucleus of the *entamoeba* disappears and a large number of chromidia fills the protoplasma. The exact knowledge of the two amoebæ, described above, we owe to Schaudinn; the former is innocent, the latter is the etiological factor of the ulcerative tropical variety of amoebic dysentery.

Totally different from these two varieties, both in the living state as well as in stained preparations and in the resting stage of the enduration forms, is the *Entamoeba tetragena* viereck (syn. *E. africana*, Hartmann) which was discovered by Hartmann in cases of dysentery in southwest Africa and which also occurs in South America and Egypt. During life and when in motion the ecto- and endoplasm are easily distinguished in this form of amoeba. The brightly shining ectoplasmic pseudopodia are very clearly differentiated from the dark and very granular endoplasm, in which latter may be found blood corpuscles as in *E. histolytica*. The large round and full nucleus may easily be recognized in the living amoeba, changing its position with the motions of the amoeba. When stained with iron hæmatoxylin, the endo- and ectoplasm show different staining reactions, the latter appears light, the former dark and granular. The nuclear structure in the stained preparation is easily recognized and very characteristic. On the inside of the perfectly round nucleus large granules of chromatin are deposited; in the middle of the nucleus there lies a distinct nucleolus—the karyosom, often with a centriol in the interior surrounded by a bright ring indicative of cyclical processes going on around the karyosom. This bright zone is characteristic of this variety of amoeba.

The propagation of *Entamoeba tetragena* occurs, according to observations made so far, only through single division. The nucleus divides by mitosis, beginning with a dumb-bell like division of the centriol; the centriols draw apart forming the polar bodies of the spindle, formed out of the chromatin granules of the karyosom. Around this spindle lies, first, a bright zone, then comes the nuclear membrane close to which are found the chromatin granules. The process of self-fertilization (autogamy) precedes that of encystation. Often, without apparent reason, a large number of amœbæ are found in a state of degeneration. The differences between endo- and ectoplasm disappear; chromidia coming from the nucleus, appear in the protoplasm of the cell and here increase in number and size, often becoming larger than the nucleus itself. These large lumps of chromatin are characteristic for *E. tetragena*. The sexual forms are smaller than the vegetative forms. Before becoming encysted their nucleus divides once more into two, then after forming two more reduction nuclei these come together again and thus complete the process of fertilization. After completing this process the cyst begins to form, showing but one nucleus. This fertilized nucleus now divides twice, finally showing a cyst with four nuclei, the characteristic of *Entamoeba tetragena*.

With regard to the forms of amœbæ cultivated by Lesage, Musgrave, and Clegg, and by Walker from the stools of certain patients, the author states that they have nothing whatever to do with the parasitic forms of dysenteric amœbæ, but are merely forms of *Limax*.—*Medical Inspector H. G. Beyer*.

TROPICAL MEDICINE.

Surg. E. R. STITT, U. S. Navy.

SYMPOSIUM. *Ankylostomiasis in the Tropics*. Section of Tropical Diseases, British Medical Journal, October 31, 1908.

Sir Patrick Manson considered that in tropical and subtropical countries, especially in rural districts, from 50 to 90 per cent of the inhabitants were infected. He notes that in about 10 per cent of cases the anæmia may be so severe as to prevent the patient from working, and in some cases causes death. While he recognizes that infection may occur through drinking water or soil-fouled food, he believes the usual channel of infection to be the skin.

As to sanitary indications he considers:

1. *Expulsion of the worm*.—Thymol and beta-naphthol are considered the most efficient vermifuges, but preference is given to beta-naphthol as being less toxic, less irritating, requiring a smaller dose, and being cheaper (about five times less expensive).

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2. *Prevention of contact with fouled ground.*—When there are no latrines and no measures for removing infected feces from the neighborhood of the house, such measures as wearing of shoes or tarring the feet have been suggested. These are expensive, and not applicable in the cases of native children.
3. *Disposal of feces.*—He regards this as the crux of the problem. By having the native deposit his excrement in a hole in the ground there would be no opportunity for the development of the larval hook worm, and if it did develop it could not reach the human skin. In the Tropics treatment of feces by chemicals or otherwise is impracticable.

Doctor Nattan-Larrier (Paris) said that by using extract of filix-mas he had had 90 per cent of success in treatment as against 50 per cent with thymol. As a method of prophylaxis he recommended 3 grams of extract of filix-mas every six months, and the wearing of shoes.

Doctor Sambon believed that the veneration in which the dung beetle, *Scarabeus sacer*, was held by the Egyptians might have been due to their disposing of infected feces. He remarked upon the rapidity with which they could dispose of feces.

Regarding the different species of hook worm which might infect man, he noted the fact that *Ankylostoma duodenale* develops perfectly in monkeys. He questions the nature of the anæmia, whether from blood abstraction, venom secretion, or secondary infections.

Daniels brought forward the importance of certain fly larvæ, particularly those of the *Sarcophagida*, in destroying hook-worm eggs. He believed that the use of chemical disinfectants might be harmful by reason of their destroying the fly larvæ.

Doctor Sandwith brought forward the point that patients died from fatty degeneration of heart, kidneys, and liver, and that it was useless to expel worms from the moribund and to expect a cure. Hence tonics, and in particular strychnine, should be employed to prepare very anæmic cases for the vermifuge treatment.—(E. R. S.)

ELGOOD, B. S. *Bilharziasis among women and girls in Egypt.* British Medical Journal, October 31, 1908.

This paper by Mrs. Elgood was considered by Sir Patrick Manson a most important contribution toward the question of etiology of bilharziasis.

In the article it is shown that bilharziasis is quite prevalent (27 per cent) among girls of the middle and slightly higher classes in the schools at Cairo. The point is made that these girls have never bathed in the Nile and that only one of the number (79 were examined) had ever run about barelegged in the country. None of them had ever paddled about in pools in the country.

The water supply was the same as that supplied European families whose children did not seem to suffer at all from bilharziasis.

The matter of the possibility of the method of storing water in the native houses is thought to be worth investigating. The water from the Cairo Water Company is stored in large porous earthen jars called "zias." These "zias" often stand in the open courtyard and are rarely cleaned out.—(E. R. S.)

OLD, E. H. H., Assistant Surgeon, U. S. Navy. **A report of several cases with unusual symptoms caused by contact with some unknown variety of jellyfish.** Philippine Journal of Science, September, 1908.

Asst. Surg. E. H. H. Old, U. S. Navy, reports 9 cases of poisoning by some unknown species of jellyfish of persons bathing in the waters above the naval station at Cavite and Olongapo.

The symptoms were:

1. Areas of erythema at point of contact.
2. Congestion of respiratory mucous membranes as exhibited by coryza, cough, and varying degrees of respiratory distress.
3. Hysterical manifestations in greater or less degree.

The native treatment of vinegar externally and sugar internally gave no relief. The administration of morphine ($\frac{1}{8}$ grain) hypodermically and sodium bromide by mouth gave almost instantaneous relief.

The point is made that a person in swimming, if at a distance from the shore or a boat, would probably drown if the victim of such a sting.—(E. R. S.)

PLEHN, A. **The diagnosis of latent malaria.** British Medical Journal, October 31, 1908.

He refers to the relative increase in large mononuclears (15 to 20 per cent). He states, however, that the infection may still be latent when the mononuclear increase has disappeared.

The basophile granules in the red cells are constantly present in latent malaria, but tend to disappear in persons returning to temperate climates even with a persisting latent infection, as shown by subsequent recurrences.

He considers that the presence of marked urobilinuria is very significant. The test he recommends is that of Schlesinger:

To unfiltered urine add an equal quantity of 10 per cent zinc acetate solution in absolute alcohol. Shake the test tube containing the mixture and add a few drops of Lugol's solution. Shake and filter. The filtered fluid shows fluorescence in greater or less degree according to the amount of urobilin.

Slight traces of urobilin can be found by this test in normal urine. The degree of urobilinuria seems to correspond with the intensity of the malarial infection. As malaria may spare the liver, so urobilinuria may not be present in such cases.—(E. R. S.)

DE BLASI, DR. DANTE. **Haemolysins and anti-haemolytic substances in the blood of malarial patients.** (From the Institute of Hygiene of the University of Rome.) *Annali di Medicina Navale e Coloniale*, 1908, Vol. II, Franc. II, p. 201.

After previous investigations by Casagrandi and Cardrucci had rendered the existence of haemolysins in the blood of malarial subjects probable, without absolutely demonstrating the same experimentally, De Blasi undertook a reinvestigation of this question, employing a new method. Experimenting with aqueous extracts, made from coagulated blood of malarial patients, he succeeded in demonstrating for the majority of the cases that the extracts from malarial blood showed haemolytic properties toward the same malarial blood as well as for normal human blood; that human blood serum, whether malarial or not, exerted an inhibitory influence upon the phenomenon; that the extract loses its haemolytic power when heated to 60° C. Extending his studies to the subject of Piroplasmosis of the dog, of the horse, and of cattle with varying results, he found in a case of equine Piroplasmosis that the aqueous extract showed a very strong haemolytic power upon the blood of the same animal.

The above characterizes the state of the question when the present investigations were begun. The first efforts were directed toward improving the technique. From 4 to 8 cubic centimeters of blood were taken from an arm vein and collected in a sterilized dish containing glass pearls. Blood from a normal subject was collected as nearly as possible at the same time. The defibrinated blood was carried to the laboratory and put in the centrifuge for half an hour. If no serum separated, normal salt solution was substituted, and this was renewed three times while the blood was being centrifuged. The serum thus obtained was then divided between a number of small tubes, each of which received 0.2 cubic centimeter of the serum, conveniently diluted with normal salt solution, and closed with sterilized stoppers.

One of these tubes was set aside and left at room temperature; the others were exposed to temperatures varying from 55° to 70° C. in a water bath. After cooling, 0.10 cubic centimeter of coagulated blood was added to each tube, including the one not heated and to another containing simply 0.9 cubic centimeter of physiological salt solution; the volume in each tube measured exactly 1 cubic centimeter. Their contents were mixed and the tubes placed for twelve hours in the thermostat at 37° C. In order to measure accurately the

degree of hæmolysis that had occurred while the tubes were in the thermostat, the author with great care made his own color scale, which leaves nothing to be desired so far as concerns chromatic accuracy. By comparison with this scale the degrees of hæmolysis that had occurred in the centrifuged contents of each tube was calculated.

For a clearer understanding of the nature of the experiments that follow, the protocol of one of them, marked Case VII, may here be cited as an illustration:

Case VII. A. S., aged 18 years, light tertian. Spleen enlarged. Contracted malaria in the autumn of 1907. Recurrence with fever on May 30. Blood was obtained on June 6 and before patient took quinine.

Experiment:

Serum.	Physiological solution.	Coagulum from blood of same patient.
Serum, fresh		Hæmolysis= 0
Serum, heated to 55°		Hæmolysis=45
Serum, heated to 60°		Hæmolysis=50
Serum, heated to 65°	0.7 c. c.	Hæmolysis=35
Serum, heated to 70°		Hæmolysis= 5
Serum, heated to 70°	0.7 c. c.	Hæmolysis= 0

In 8 out of 13 cases of malaria, when examined according to the above-described method, De Blasi was able to demonstrate the existence of hæmolytic substances in the serum heated to temperatures varying between 55° and 70° C.

While then it had never before been possible to prove the existence of hæmolytic substances in malarial blood, with experiments in vitro, by the method of De Blasi it could be shown not only that hæmolytic but also anti-hæmolytic substances were present.—*Medical Inspector H. G. Beyer.*

GENERAL MEDICINE.

Surg. R. M. KENNEDY, U. S. Navy.

SOUTTAR, H. S. The direct inspection of the gastric mucous membrane. The Quarterly Journal of Medicine, July, 1908, pp. 375-385.

In this article the author reviews our present methods of diagnosis of gastric disease and cites various cases in exemplification of his contention that many of them upon which reliance is placed are of limited value. His argument for the more general employment of the gastroscope is in substance as follows:

Our knowledge of the pathology of this most important secreting membrane is limited to a few gross lesions, such as ulcer and carcinoma. Of the pathological anatomy of the various digestive dis-

orders we know almost nothing, for at autopsy the mucous membrane has usually been so altered by the digestive juices that accurate investigation is impossible. And in diagnosis we are frequently at a loss to know whether a patient is suffering from a functional disorder of the mucous membrane, an ulcer, or a malignant growth.

The diagnosis of the graver disorders of the stomach has lately been the subject of research by many workers. The result of their labors has been that many of the conclusions formerly relied upon for diagnosis have been considerably modified, and instead of becoming simpler the subject has rather gained in complexity. The two common diseases of the stomach in which early diagnosis is imperative are carcinoma and ulcer. In many cases the failure of the present methods of examination is notorious.

In carcinoma of the stomach we have a form of new growth, which remains localized to the stomach for some time, and if the condition could be recognized in an early stage surgical interference might lead to much more favorable results than at present are secured. Frequently the diagnosis is not made until a tumor can be palpated, and it is now known that under these circumstances secondary infection of the lymphatic glands has almost invariably occurred. Consequently it is imperative that a diagnosis be made before the tumor becomes palpable.

The physiological examination of the gastric secretion was, at one time, thought likely to be of great service. Dr. Golding Bird first noted that the secretion of HCl was greatly diminished or absent in many cases of carcinoma ventriculi; but recently many cases of gastric cancer have been published in which the amount of HCl in the test meal was either normal in amount or even increased, and it seems probable that the absence of HCl is due rather to the accompanying gastritis than to the carcinoma itself. Moreover, cases investigated by reliable observers have shown that carcinoma in parts of the body other than the stomach leads to a great diminution of the amount of HCl in the gastric juice. Consequently we must accept the conclusion of Von Jaksch and others, that the presence or absence of free HCl in cases of carcinoma of the stomach is a symptom of doubtful import, and that it must be weighed in conjunction with the other circumstances of the case.

It is doubtful whether the other abnormalities found in test meals from cases of cancer of the stomach, such as the presence of lactic acid and of the Oppenheimer-Baer bacillus, are more than indications of the gastritis which is so often an accompaniment of gastric cancer.

As regards chronic gastric ulcer, the presence of profuse hæmatemesis in a young adult or person of middle age was formerly thought to be an important point in diagnosis. But the admirable clinical researches of reliable observers have shown that profuse hæmorrhage

may occur from the gastric mucous membrane when chronic ulcer does not exist, and that this condition of gastric erosion is far more common than was formerly thought to be the case. Moreover, in chronic ulcer it is doubtful whether there is always an increased secretion of free HCl, as was claimed, for investigators found that in gastric ulcer the amount of free HCl is often deficient.

The points laid before the reader in this interesting paper are convincing, and even such brief consideration of the subject as the foregoing will serve to show that the introduction of a method by which the gastric mucous membrane could be directly inspected by the gastroscope which the author describes may lead to an improvement in the treatment of disorders of the stomach, as has the cystoscope in genito-urinary disease.—(R. M. K.)

WEBSTER, R. W. **Toxemia from the standpoint of perverted metabolism.** American Journal of Medical Sciences, May, 1908, pp. 688-696.

In his interesting and instructive paper the writer clarifies our knowledge of the subject in this rather new light with signal success. He defines Toxemia as a condition characterized by the overloading of the blood with normal or abnormal products of food or tissue metabolism. This condition is therefore purely endogenous in character and is sharply separated from those conditions associated with toxic symptoms due to exogenous products as well as from those toxemic states arising in the course of infectious diseases. Of course, the toxemia related to abnormal intestinal activity may be due to bacterial action to some extent, but the bacteria concerned in such processes are normal habitants of the intestinal tract, and may therefore be considered aside from those producing the acute infections. Toxins elaborated by the activity of specific micro-organisms upon the various classes of tissue of the body, cause, oftentimes, such an intense poisoning of the system that death results, but this specific toxemia is not referred to in this paper. Webster says that it should be further remembered that excessive normal or abnormal activity of one organ may so influence the activity of other organs that a toxemia may follow as a result of perverted secondary metabolism.

In this paper intestinal, hepatic, renal, thyroid, and other toxemias are considered.

In conclusion the author has to state that toxemia, aside from that following the acute or chronic bacterial processes, is always of metabolic origin. The toxemias under discussion are more the effects of a general metabolic perversion than of a direct organic disorder. A specific toxemia, in the sense that it is due to a specific substance, is unknown in the class of toxemias discussed.—(R. M. K.)

FAUGHT, F. A. **A rapid method of test-meal removal, lavage and inflation.** Reprint from *Monthly Cyclopædia and Medical Bulletin*, August, 1908.

This improved method can not fail to be appreciated by those who have had any experience with the ordinary gastric tube now in vogue, while by those few who have already had opportunity of using this device with uniform success in both hospital and private practice, its great superiority is amply proven.

The adoption of this method at once does away with all the uncertainty and uncleanness of the present method, while it greatly reduces the patient's discomfort by materially shortening the time required to complete the procedures. Last, but not the less important, this combination allows the operator to dispense with the service of an assistant, at the same time being able, not only to remove a test-meal, but also to outline the stomach by inflation and to follow this by thorough irrigation, closing the séance if desired by introducing a definite quantity of medicinal solution.

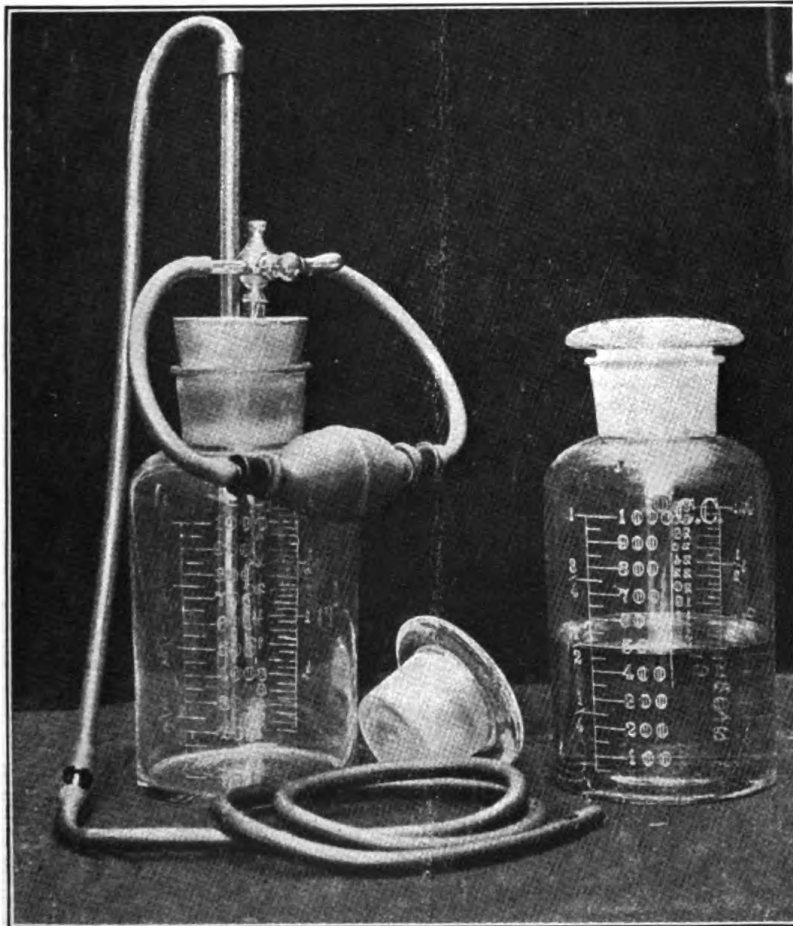
Briefly described, this apparatus and the technic of its employment is as follows: The two bottles, which are graduated in centimeters, are placed upon a convenient table and one filled exactly to the 500 cubic centimeter mark with warm sterile water. The double perforated stopper is fitted with the valve in one hole and a section of large diameter glass tubing is made to extend through the other opening to reach to the bottom of the bottle. This stopper, and its attachments, is placed firmly in the mouth of the empty bottle.

The two horizontal arms of the valve are connected by means of short sections of rubber tubing with the two ends of the double-action Davidson bulb. The gastric tube, which should be extra long and of large caliber ($\frac{1}{2}$ to $\frac{3}{8}$ inch), is connected to the projecting end of the glass tube. Before passing the tube, test the position of the valve and set it to make negative pressure within the bottle. The preliminaries completed, the gastric tube is inserted and carried in until the mark upon the tube approaches the incisor teeth. Now, holding the tube in place with the hand, a few rapid pressures are made upon the bulb. This will usually cause the gastric contents to flow into the bottle. During the procedure should sudden stoppage of the flow occur before sufficient material has been recovered, this obstruction may be readily overcome by momentary reversal of the valve, this followed by one or two pressures on the bulb will drive out the obstruction. Now, returning the valve to its original position, the removal may proceed.

TEST-MEAL REMOVAL, LAVAGE AND INFLATION.

In the event of failure to obtain a specimen by this means, then the addition of a quantity of water to the contents of the stomach becomes necessary to accomplish our end. For this purpose the stopper with its attachments is transferred to the bottle containing the 500 cubic centimeters of water, when the valve is set for compression, and about 400 cubic centimeters of this water gradually run into the stomach. The valve is then reversed and by continued manipulation of the bulb all material possible is removed from the stomach. It is essential for quantitative computations that at the end of this effort more than 500 cubic centimeters be recovered.

This apparatus affords a very ready and accurate method of outlining the stomach. This may be accomplished in the following way: Put the stopper with its connections into the empty bottle, then with the patient in the recumbent posture the stomach is carefully outlined by auscultatory percussion, and the finding marked upon the skin with a dermatographic pencil. The percussion note is then altered by the introduction of a small amount of air from the bulb.



APPARATUS FOR TEST-MEAL REMOVAL, LAVAGE AND INFLATION.

and the outline again determined and compared with the first marking. An accurate check may be maintained by altering the percussion note at will by alternately removing and returning a small quantity of air. If care is observed there is no danger of altering the relation of the stomach, either as regards its form or its relation to the adjacent viscera.

SAJOURS, C. E. DE M. *The therapeutics of diseases which involve the internal secretions. Mercury in the treatment of tuberculosis—its mode of action—a warning.* Monthly Cyclopædia and Medical Bulletin, October, 1908.

In his article the writer opens with pointed reference to the benefit from the use of mercury in the treatment of tuberculosis, and expresses himself as of the opinion that Surgeon Wright's conclusions are well founded. He briefly reviews the history of this metal in the treatment of tuberculosis, and in enumerating those who have advocated it from time to time quotes Havilland Hall as saying, "We have in the different preparations of mercury, administered to phthisical patients in small doses, the most potent weapon with which to combat this most malignant foe of mankind." He then comments upon the opposition which this drug in the treatment of tuberculosis has met and the fate it has suffered in the past. In the fear that the method employed by Doctor Wright may similarly disappear from the horizon, he discusses the question and sounds a warning in the following words:

How account for the antagonistic results which have inspired such differences of opinion? Thirty years' work in the medical profession has led me to accept with more confidence than the average medical man perhaps, the clinical reports of those who obtain encouraging results, and to ascribe to imperfect technique or injudicious dosage most of the unfavorable observations recorded by their critics. Indeed, my labors as editor of the "Annual of the Universal Medical Sciences" have imposed the conclusion that owing to this untoward feature of modern practice and the multitude of valuable suggestions it has relegated to oblivion, medicine had become a veritable graveyard for valuable ideas, including many practical suggestions which would have bestowed incalculable blessings upon suffering humanity. Nor are the multitude of clinicians who have contributed to the downfall of many promising remedial methods subject to censure; the true cause is one which lies at the foundation of therapeutics—the prevailing obscurity concerning the mode of action of drugs, and of mercury in particular, in the present connection. The phenomena this agent awakens are familiar to everyone, but how these phenomena are produced text-books do not tell us. It is this phase of the question that my investigations into the functions of the ductless glands seem to me to have elucidated, and in doing so they have shown not only why mercurials should be of great value in tuberculosis, but also how their injudicious use could be productive of much harm in this disease.

In the second volume of "internal secretions" (p. 1147), to which the reader is referred for evidence in support of the conclusions herein submitted, I urge that "the various salts of mercury owe their therapeutic value to the energy with which they stimulate the test organ. In minute doses they promote nutri-

tion, i. e., act as a tonic because, by stimulating the test organ, they increase the secretory activity of the adrenals, and enhance, therefore, general oxygenation and its logical corollary, the power to combat infection." That this meets a prominent morbid feature of the disease is emphasized by the stress laid by a clinician of vast experience in this connection, Dr. C. Theodore Williams, of London, at the recent tuberculosis conference in Philadelphia (September 25), that "the history of consumption had shown that more could be accomplished by measures which augment and invigorate the resisting powers of the patient, than by those which aimed at destruction of the pathogenic germ."

It becomes a question, however, whether the invigorating influence of small doses of mercury does not also include destruction of the pathogenic organism. That such is the case—though not directly, as is now believed—has likewise been made clear by my investigations. The increased oxygenation and metabolism referred to above is but the precursor of a far more important process—that of enhancing the bactericidal properties of the blood. In other words, the increased oxygenation of all organs brought about by the mercury causing these organs to act with greater vigor "the function of the pancreas, the thyro-parathyroid apparatus, and the leucocytogenic organs is correspondingly activated, the quantity of auto-antitoxin (and I would add, the proportion of phagocytes) in the blood is augmented." The product of the thyro-parathyroid bodies being in the light of my views (and as shown by chemical concordance) Sir A. E. Wright's opsonin, while the pancreatic product is the recognized homologue of Metchnikoff's cytase and Ehrlich's complement (the adrenal secretion being Ehrlich's amboceptor) we have available in the blood an increased volume of those substances which have now incontrovertibly been shown to be the defensive agents with which the body antagonizes infection.

In the presence of these facts, the beneficial influence of mercury observed by the above-mentioned authors finds their explanation—the drug increased the bactericidal properties of the blood. But a feature of cardinal importance must be emphasized in this connection. We have seen that it is to small doses that Havilland Hall refers when he characterized mercury as our most efficient weapon; it is also by means of small doses that all the authors enumerated obtained their beneficial effects; it is also with moderate doses administered at prolonged intervals that Surg. Barton L. Wright obtained his good results.

* * * * *

The foregoing statements suggest the conclusion that it is because of the employment of large doses that the antagonists of mercury in tuberculosis owe the results which have led them to condemn its use. The conception of the curative process I have submitted readily explains the production of untoward effects—nay, death itself—by such doses.

The effects of the large, or frequently repeated, doses are familiar to every one. The term "cachexia" applied to mercurialization recalls suggestively a corresponding state in tuberculosis; the rapid emaciation that attends mercurial intoxication also betokens a kindred process, one of active destruction. This is especially evident in the blood, which becomes watery owing to the destruction of its elements. "Its solid constituents are notably diminished," writes H. C. Wood, "including the albumin, fibrin, and the red corpuscles." If we inquire into the manner in which these morbid effects are produced—in the light of the views I have submitted concerning the physiological action of mercury—a ready answer imposes itself, viz, large doses increase so actively the immunizing constituents of the blood, that the germs are not alone destroyed, but the red corpuscles and other blood elements as well. In other words, the proteolytic or digestive properties of the blood become so intense that blood-

cells and tissues even are broken down, and a new source of "consumption" is added to the tuberculous process.

The manner in which the opponents of mercury were driven to this attitude becomes self-evident under these conditions—they used not small and therefore beneficial doses of mercury, but large and destructive doses of this agent. Dr. Barton L. Wright's rehabilitation of this method will suffer the same fate as that of his predecessors if this important practical feature is not borne in mind.

On the whole, my investigations in this connection^a suggest:

1. That small doses of mercury are beneficial in the treatment of tuberculosis because they enhance to a marked degree the production of bacteriolytic and antitoxic substances in the blood, and thus insure the destruction of the tubercle bacilli and their endotoxins.

2. That full or large doses of mercury are harmful in this disease because they provoke an excessive formation of these substances and thus cause hæmolysis, and even cellular autolysis when sufficient quantities to induce mercurialization are administered. (W. H. B.)

FRIEDLANDER, A. **Flexner's serum in the treatment of epidemic cerebrospinal meningitis.** Medical and Surgical Progress, November, 1908, pp. 897–899.

Friedlander's comprehensive review of this important subject is a valuable and timely message to the medical fraternity, bringing understanding and making intelligent cooperation in the measure possible. He says that while it must be admitted the last word has not as yet been spoken with reference to the absolute value of Flexner's serum treatment of epidemic cerebrospinal meningitis, it is unquestionably true that the serum is of very distinct value in lowering the mortality rate of a most dreadful disease. The very recent publication of the papers read at the last meeting of the American Pediatric Society, when Flexner himself made a summarized report of the cases treated, make this plain. A careful reading of Flexner's original paper is warmly recommended to those interested in the subject.

In 400 reported cases a bacteriologic diagnosis was made in every instance. Excluding the cases which did not live twenty-four hours after the first injection of the serum (seven in number, either moribund or fulminant), there were 393 cases treated with the serum. There were 295 recoveries (75 per cent) and 98 deaths (25 per cent)—a rate much lower than has ever been obtained heretofore by any other method of treatment. In general terms, the results were better the younger the patients and the earlier the treatment was begun. Patients under one year of age did not do so well, however. According to the time of the first injection with reference to the duration of the disease, 361 cases were analyzed. In cases where treatment with injection was begun on the first to third day mortality was 16.5 per

^a Sajous: "Internal Secretions and the Principles of Medicine," Vol. II, pp. 1146 and 1609, 1907.

cent; fourth to seventh day, mortality was 23.8 per cent; later than seventh day, mortality was 35 per cent. The beneficial results of early injection would thus seem sufficiently obvious. But, to quote the author, "so long as the diplococcus is still present in the meningeal exudate, and mechanical damage to the anatomical structure is not irreparable, the employment of the serum holds out hope of considerable benefit." Of 273 cases which could be analyzed, 200 terminated by lysis and 73 by crisis. With reference to duration of disease under serum treatment, it may be noted that in 228 recovered cases the average duration of active symptoms was eleven days.

INFLUENCE ON DIPLOCOCCI, SPINAL EXUDATE AND LEUCOCYSTOSIS.

Very soon after the serum injections the diplococci tend to become wholly intracellular. They soon also present certain changes in appearance, such as swelling and fragmentation. They stain diffusely and indistinctly and coincidentally tend to lose their viability in culture. The exudate loses pus cells rapidly; indeed, some cases with distinctly purulent exudate have recovered under serum treatment. Correlated with the disappearance of the diplococci and the clearing of the exudate, the general leucocytosis diminishes rapidly. The reverse of this phenomena is noted in cases not responding to the serum or responding imperfectly. The general statement can be made that progressive increase in the turbidity of the exudate, rise in leucocytosis, and the greater persistence of diplococci with retention of vitality after several serum injections, are unfavorable symptoms. Speaking generally, also, it may be said that relapses are ushered in by increased exudate, leucocytosis, and reappearance of diplococci though they may not regain the power to grow in vitro. Relapses were not very frequent in the series. They are not apt to be fatal if the serum is pushed. In most cases, recovery, if it ensue, is perfect. Very few permanent complications were noted. This is also in contrast to recovery in meningitis without serum treatment where physical or mental defects are almost the rule. The only persistent defect noted was deafness and, more often than not, it was noted early before the injections were begun.

Dunn, who reported 40 cases, serum treated, has 31 recoveries (77.5 per cent) and 9 deaths (22.5 per cent); of the 31 recoveries only 2 showed permanent defect, 1 deafness and the other deafness and blindness. Dunn finds that at the Childrens Hospital in Boston, the mortality before serum treatment had varied from 58 to 80 per cent of all cases. Of these 9 fatal cases, 5 were seen very late (thus emphasizing the necessity for the early use of the serum). The three principal (clinical) effects of the injections that Dunn found were: (1) Fall of temperature; (2) improvement of the patient's general condition; (3) cutting short of the duration of the disease. Dunn

believes that the serum, if it be at all active in a given case, causes cessation of the active process, the resulting course of the disease depending mainly on the extent of tissue damage already done.

Churchill reports 9 cases, serum treated, with 7 recoveries (70 per cent) all without serious sequelæ. He calls particular attention to the change in the patient's mentality following the injections. The patients are brighter and more rational. It is not uncommon to see a patient lying with head markedly retracted yet perfectly conscious and without pain. Churchill advises lumbar puncture in suspicious cases, with immediate serum injection if the spinal fluid be cloudy, without waiting for bacteriologic tests. If these confirm the diagnosis, the injection is to be repeated within twenty-four hours.

Koplik holds that the Flexner serum is certainly a factor to be reckoned with in the treatment of cerebrospinal meningitis.

Holt presented statistics of the 1904 epidemic in New York. Of 2,350 cases, all treated without serum, the mortality was 75 per cent. Of 350 cases of known duration, without serum, 50 per cent lasted five weeks or longer, a striking showing in comparison with Flexner's records.

Closing the discussion, Flexner showed reports from an epidemic at Belfast, Ireland. Outside the hospital, cases treated without serum showed a mortality of 80 per cent as contrasted with 26 per cent mortality in hospital where the serum was used.

The serum itself is bacteriolytic. It does not produce in test animals neutralization of the toxin according to the law of multiples, as do diphtheric and tetanic sera. The guinea pig can be protected up to a certain amount only. In the use of a serum of this class results depend to a considerable degree on the concentration. The antibody should therefore be present in a certain concentration. Flexner believes that the success of the serum has been due to the fact that a bacteriolytic and somewhat antitoxic substance is brought into direct contact with the focus of the disease. The poison of the diplococcus is largely a local one, acting chiefly on the nervous system. Hence the endeavor to bring the curative agent in direct contact with the focus of the disease which is a slight departure as Flexner observes, from the general notion of the manner in which infectious processes are influenced by curative sera.—(R. M. K.)

ELSNER, H. L. Vascular crises. New York State Journal of Medicine, June, 1908, pp. 295-299.

To those interested in this subject, the above article will prove very instructive.

A number of years ago the term "vascular crisis" was introduced—a splendid characterization—to use in connection with recurring

symptoms, usually painful, which arise in the domain of changed arteries.

Vascular crises it may be said are associated with diseased arteries in which a definite symptom complex is due as a rule to vascular contraction, narrowing of the artery, or arterial spasm, though occasionally it may be assumed that dilatation or vasodilator paralysis may predominate. If we agree that these crises occur, and most clinicians subscribe to the conclusion, then a great many of the conditions to which we have referred are readily and easily explained. We can thus promptly explain the unique behavior of angina pectoris and other paroxysmal conditions always painful and often threatening.

The fact is emphasized that vascular crises are usually provoked by some factor which throws extra tax upon the organ invaded. Thus, it is not at all uncommon to find that a patient develops angina pectoris after a hearty meal when the stomach is full and digestion is in progress. If, at such time he walks or exerts himself physically, an added amount of work is placed upon the organ, an extra amount of blood is needed, the nutrient arteries are insufficient, revolt follows, arterial paralysis or spasmodic contraction of the changed artery results.

Arteriosclerosis far advanced may be present for years, associated with coronary involvement without a suggestion of angina pectoris; the element of vascular spasm has never been added.

The Adams-Stokes phenomenon is often dependent on vascular crisis. This phenomenon is one of the most interesting combination of symptoms that we meet. Included in this complex are bradycardia, peculiar epileptiform seizures, disassociation of ventricular and auricular contractions, causing a venous pulse out of proportion to the slow arterial contraction, the latter at times being slower than the respirations, in which the symptoms are due to a "block" in the "fibers of Hiss"—lesions involving the arteries supplying the interventricular septum; or, as has been recently shown, gummatous or other masses breaking the continuity are responsible for the symptoms. Here again we have persistent conditions, but the symptoms are paroxysmal. "Heart block," it would seem, can be satisfactorily explained by the changes which affect the "bundle of Hiss" during arterial spasm or vascular crisis. The symptoms are due in all probability to a recurring shutting off of nutriment to these important heart fibers. Arteriosclerosis of the vessels in the interventricular septum is not unusual.

Occasionally a patient who has had angina pectoris presents without symptoms referable to the pectoral region, without the characteristic radiation of pain from the heart into the arm, but with pain below the diaphragm, and all the fears of true angina pectoris. This

may be due to either a spasm of the mesenteric arteries or an expression of coronary disease; or, as sometimes happens, there may be disease of both coronaries and the mesenteric vessels, particularly the superior mesenteric artery. The sensory paroxysmal symptoms are due to vascular crisis. The coronary may alternate with the mesenteric crisis. One may occasionally follow closely upon the heels of the other.

There is a condition which must be divorced from angina pectoris and which Ortner has described under the head of *dyspragia intestinalis intermittens*, in which the greater change is localized in the mesenteric vessels. The history of these cases is exceedingly interesting. These patients have more or less intestinal indigestion, foul-colored stools, a great deal of flatulence, eructation of gas, attacks of pain, particularly in the upper abdominal regions, which are paroxysmal and generally associated with the fear of impending death; there may or may not be hypertension. There is an angio-spasm within the splanchnic area which yields to vaso-dilators. Post-mortem examination shows greatest change in the superior mesenterics of a degenerative character. These patients may die suddenly as do those suffering from pectoral angina.

Another class of cases included is that which has puzzled clinicians during many years, in which there are evanescent symptoms of cerebral origin, no embolism, nor cerebral hemorrhage, but in which the symptoms are sudden and evanescent.

For instance, a patient in whom atherosclerosis has been diagnosed, without warning, possibly with a slight preceding headache, suddenly becomes aphasic. There is no evidence of paralysis or convulsions in the majority of cases, but a sudden complete ataxia and amnesic aphasia. The patient may be able to mumble but is unable to express himself. He has not lost consciousness; he points to objects correctly; he understands what you say to him; but there is this complete abeyance of speech function. In the course of four or five minutes, possibly a little longer, the symptoms begin to fade or disappear suddenly. The patient seems entirely unaffected by what has transpired and is able to continue his conversation without the slightest trouble, and returns to his former condition. There are no resemblances to epilepsy when the case is carefully studied; arterial pressure is high. Vascular spasm causes these symptoms. Spasm of the cerebral vessels is usually associated with diseased arteries.

If vascular crisis leads to death, hemorrhages are no more likely to be present in the brain than are hemorrhages into the heart muscle where death has been due to angina pectoris, though cerebral hemorrhages may cause death and follow a long series of vascular crises.

In connection with this subject the author refers to painful affections of the extremities due to vascular crises. A diseased condition

to which considerable attention has been paid of late, is intermittent claudication. He says we are hearing and learning more of this peculiar condition which as arteritis obliterans is better understood. It is a condition which is due entirely to changed blood vessels with added arterial spasm as the lumen grows smaller.

These pains of an intermittent character, associated with arterial degeneration in the extremities, are frequent, and in many cases persist during years, indeed, many years before endarteritis obliterans completely shuts off the blood supply, in some of these cases leading to localized gangrene or limited patches of necrobiosis. Physical examination of these cases shows hypertension as a rule with marked evidence of arteriosclerosis.

Another class of cases in which vascular crises affecting the extremities predominate, may be considered under the head of erythromelalgia, a condition associated with most distressing suffering, limited, as a rule, to the lower extremities, in which the pain is paroxysmal, is associated with great redness of the extremities, particularly when suspended. This characteristic redness has given the disease the name of "red neuralgia."

The blood vessels have been examined in these cases and it was invariably found that the disease was not limited to the nerves but was due to an obliterating endarteritis or a degenerative change of the blood vessels of the extremity involved. The author, during the past twelve years has published the records of a number of cases in which it was shown that erythromelalgia may persist during many years, and may be followed by either Raynaud's process or may be associated with it or with far-reaching gangrene.

From these cases the great influence of vascular spasm may be assumed; in all, the arteries showed positive endarteritis.

When these conditions persist for years before gangrene develops, with pains that are paroxysmal, and in some cases long periods of freedom from symptoms, we may be sure, the author says, that we are dealing with vascular crises—a spasm of the arteries associated with incipient degenerative change.

An interesting experience that seems to corroborate the theory of vascular spasm in erythromelalgia and intermittent claudication is mentioned by Ortnier. He mentions the case reported by Wagenmann of a man about 63 years of age who had arteriosclerosis and who had transitory periods of blindness in his right eye. On one occasion Wagenmann was present when the man became suddenly blind. He made an ophthalmoscopic examination and found that the arteries during this period of blindness in the background of the eye, the retinal vessels, were empty. They were converted into thread-like shining strands, yellow in color. Normal pulsation had ceased. The veins resembled thread-like but red strings. Pressure on the eye did

not cause pulsation. Wagenmann had the opportunity of observing the background of this man's eye during the entire period of blindness which continued ten minutes and vision returned as the spasm of the vessel was relieved, the arteries filling and the veins dilating with a return of pulsation.

This is a most interesting and telling experience in connection with this subject of vascular spasm. It proved that in the case recorded there was a complete occlusion of the blood vessels, a spasm which shut off the blood supply, and that vision only returned when that spasm was relieved and the circulation was restored. The circulation during the spasm was positively inhibited.

In the pains of lead colic in which arterial tension is high, as well as in the crises of locomotor ataxia with arteriosclerosis, with, in both, a strong suspicion of changed mesenteric vessels, vascular spasm within the splanchnic area may ultimately prove to be a predominant factor.—(R. M. K.)

HISS, PHILIP HANSON, JR. The curative influence of extracts of leucocytes upon infections in animals. *The Journal of Medical Research*, November, 1908, p. 323.

In this paper the author places on record the results of some experiments of more than ordinary interest.

Starting from the assumption that, in many of our curative sera, something is lacking, which may be either a toxin-neutralizing body or a complementary body necessary for activating the different immune bodies, he has attempted to supply these various deficiencies by the employment of extracts from leucocytes.

While in experiments in vitro complements may be supplied through the addition of fresh normal sera in the body of infected animals or of man, these must be supplied locally from the plasma or the cells. Such bodies may not exist in the free state in the circulating blood, as is the case with the immune bodies, and consequently these bodies must remain inactive against the invading micro-organism. Consequently complements must be supplied from outside sources.

Since Metchnikoff has demonstrated that the cytases—micro and macro—are not normally found free in the plasma, but are usually contained inside the leucocytes and by them given up only under stress of death or injury, and that the immune sera become destructive agents for the invading micro-organisms only by virtue of their combining power with the products of injured leucocytes, it seemed, indeed, reasonable enough to expect that extracts from leucocytes, when injected into infected animals, ought to throw some light upon this difficult question.

It was, moreover, argued from the above well-grounded assumptions, that these substances—whether digestive, poison-neutralizing, or complementary in nature—might possibly be liberated from leucocytes by certain methods of extraction and, when introduced in this free state, act not only by assisting the leucocytes of the body in a state of semiexhaustion to recuperate and resume their flagging functions, but at the same time afford a more direct protection to the more highly specialized body cells.

In all the recorded experiments with some of the most prevalent infections the results obtained have apparently justified the author's expectations.

Thus, animals suffering from severe septicæmias and poisonings, following intravenous injections of such organisms, as staphylococci, streptococci, pneumococci, typhoid bacilli, and meningococci, have shown the beneficial effects from treatment with extracts of leucocytes and have, in many instances, survived the infections that proved fatal to the control animals within thirty-six hours, even when the treatment had been delayed twenty-four hours after the infection.

It would seem, therefore, that the results obtained in these experiments are quite significant and noteworthy, especially when it is considered that freshly obtained living leucocytes, when introduced into infected animals even intraperitoneally, remain practically without effect in systemic infections.—*Medical Inspector H. G. Beyer.*

HYGIENE AND SANITATION.

Medical Inspector H. G. BEYER, U. S. Navy.

PANWITZ, Prof. Dr. GOTTHOLD (Secretary-general of the International Anti-tuberculosis Association). **Koch's standpoint with reference to the question of the relation between human and bovine tuberculosis, discussed at the Congress on Tuberculosis in Washington, 1908.** *Tuberculosis*, Vol. VII, No. 11, November, 1908, p. 459.

The question of the exact relation existing between human and bovine tuberculosis has been one of steadily increasing interest and importance, both from the theoretical as well as from its practical side ever since 1901, when Professor Koch read his epoch-making paper at the London congress. What wonder therefore that this question should have come up for discussion at the congress at Washington in the presence of its illustrious author and originator and of the most celebrated veteran opponent to Koch's views. While the question itself has not been answered definitely by this discussion, a much clearer understanding of it has undoubtedly been brought about by the formulation of the conditions upon which alone such a question can be answered and decided finally. Meanwhile no one

even remotely connected with the subject of tuberculosis can well afford to be ignorant of the exact state of this question.

Koch's standpoint is in substance as follows: (British Congress on Tuberculosis in 1901):

1. The tubercle bacilli of human tuberculosis are different from those of bovine tuberculosis.
2. Human beings may be infected by bovine tubercle bacilli, but serious diseases from this cause occur very rarely.
3. Preventive measures against tuberculosis should, therefore, be directed primarily against the propagation of human tubercle bacilli.

Koch, standing practically alone in the position he assumed in 1901, never expected that his views would be accepted as final and asked that they should be tested by experiments, and this has been done by a host of investigators.

After pointing out the many sources of error that must be considered in research work on tuberculosis and after measuring all the work done on this subject during the last seven years by the strict scientific standard of the conditions to which such work must correspond, he finds that there is nothing that can be considered as having seriously shaken the position he held at the London congress.

First, as regards the pronounced difference between human and bovine bacilli, Koch finds that all competent investigators are now agreed that the tubercle bacilli of human origin differ from those of cattle and that we must differentiate between a human and a bovine type. The British commission, while admitting the differences existing between these two types, has created a third or unstable type, produced after passage through animals. Koch does not look upon this type as playing any part in the practical problem under discussion and refuses to recognize it. The views expressed by Calmette, that the bacilli change their characters on their way from the mesentery to the lungs, are regarded as hypothetical and without the slightest evidence of support.

Second, according to Koch the bacilli of the human type have never been demonstrated in cattle; the bacilli of the bovine type have been found in the cervical gland and the intestinal tract of man, but remain with few exceptions localized. The few known cases in which bovine tuberculosis is said to have produced a general and fatally progressive tuberculosis in man appear to Koch not above suspicion.

Third, in closing his paper Koch says:

I have still one point to discuss which seems to me of high importance, e. g., of all human beings who succumb to tuberculosis eleven-twelfths die of consumption (pulmonary tuberculosis) and only one-twelfth of other forms of the disease. One would have expected, therefore, that those investigators who are interested in establishing the relations between human and bovine tuberculosis would have searched for bacilli of the bovine type preferably in cases of pul-

monary tuberculosis. This, however, has not been the case. Evidently animated by a desire to bring together as many cases as possible of bovine tuberculosis in man they have investigated particularly cases of gland and intestinal tuberculosis. In spite of this bias, under which the researches hitherto have suffered, there still remains at our disposal a sufficient number of investigations of pulmonary tuberculosis to warrant a provisional expression of opinion. The gist of it is—and I beg you to take note of it—that up to date in no case of pulmonary tuberculosis has the tubercle bacillus of the bovine type been definitely demonstrated.

If on further investigation it should be established that pulmonary tuberculosis is produced by the tubercle bacillus of the human type exclusively, then the question will be decided in favor of the view which I have upheld, and we must direct our regulations for combating tuberculosis by all means primarily against the tubercle bacilli of the human type.

Throughout a lengthy discussion, carefully weighing the pros and cons, taken part in by Theobald Smith, Woodhead, of Cambridge; Orloing, of Lyon; Fibiger, of Copenhagen; Rau, of Liverpool; Ravenel, of Madison, Wis., and others, Koch remained unconvinced by the views advanced to shake his position.

The opponents of Koch were mostly veterinary surgeons. Koch's views were seconded by Theobald Smith, of Boston, and Tendelos, of Leyden. Professor Woodhead, of Cambridge, also agrees with him as regards the facts established.

It is quite clear that the measures to be taken against tuberculosis must take quite a different character, according as to whether the infection of man by tuberculosis emanates predominantly from man or from cattle, and, therefore, we are anxiously awaiting the result of the work promised to be undertaken within the next few years by Koch and the benefits of which will be given to the world at the next Congress on Tuberculosis in Rome.—(H. G. B.)

The prevention of tuberculosis. Extract from "The Surgical and Medical History of the Naval War Between Japan and China," 1894-95.

On February 24, 1898, Baron Saneyoshi, director of the sanitary bureau, issued the following instructions about the prevention of phthisis:

We have already issued instructions concerning measures for the prevention of phthisis, but we see that the number of the patients has been gradually increasing of late, a fact which must be regarded with profound regret. We therefore hereby request the surgeons concerned to pay greater attention to the prevention of the disease.

(a) At the bodily examination of seamen newly to be enrolled the healthy state of the respiratory organs should be made a chief requisite, special heed being paid to the conditions of the chest: persons with a tuberculous constitution, or with a history favorable to the formation of disease, should not be enrolled.

(b) Patients suffering from phthisis, or suspected of it, should be admitted to hospital, or placed in the wards as early as possible, so that they may be isolated from other healthy persons.

(c) Still greater attention should be paid to the cleaning of barracks and ships, and also the disinfection of the spittle.

(d) In case the disinfection of rooms and articles used by phthisical patients be necessary, articles Nos. 39 and 40 of the "Surgeons Service Regulations" should be observed as carefully as circumstances will admit.

On October 3, 1899, the minister of the navy promulgated the following instructions:

In our navy there has been observed of late an increasing frequency in the number of phthisical patients. This is a matter of regret, as it is a blow to the strength of our navy. Now, as phthisis is chronic in its nature it is infectious in a slow and insidious way. At its early stage the symptoms are very obscure, and even when they become apparent the bodily strength is comparatively little impaired. The sufferer thus often engages himself in service, and even neglects the treatment of the disease until it is too late for any means of remedy. This may seem a very praiseworthy thing, for he sacrifices his own interests for those of the country. But further consideration will easily show that this is an injury both to the patient himself and to the others and to the country, for the disease insidiously spreads among his company. Such conduct is indeed exactly at variance with the great responsibility of men in the naval service and must scrupulously be avoided by them. Therefore, from admirals down to seamen, any and every man in the service whenever they discover themselves showing symptoms of phthisis—that is, coughing, spitting, rise of body temperature, and decrease of strength—should directly go and undergo examination of the surgeons and devote themselves to recuperation. On the other hand, when the surgeons happen to meet such patients they should examine them with scrupulous accuracy, and persons recognized as undoubted cases of phthisis should be made to apply themselves wholly to the recuperation of their health, and should not be given merely temporary measures of treatment in the intervals of their duties.

Notwithstanding the repeated instructions concerning the prevention of phthisis, and their strict observance, we do not, unfortunately, see the disease brought under control. Its causes may of course be various, but we are compelled to attribute it mainly to the narrow living space on board ship and torpedo boats. It is well known the space allotted to the crews at present is exceedingly narrow. This is especially the case with the steerage where men sleep, for on a comprehensive investigation we find that the average space occupied by each petty officer and seaman is some 102 cubic feet. This is only one-sixth of that allotted to the soldier in the army, who gets about 653 cubic feet per man. It is impossible in the steerage of a warship or torpedo boat to make up for the lack of space by means of artificial ventilation. To thoroughly ventilate a space of this kind will cause drafts, and as such ventilation is impossible, a diminution of injurious effects is all that can be expected from ventilation. The rooms on board a torpedo boat furnish a more striking instance. To work, to talk, to dine, to sleep in narrow places like those on board a torpedo boat, who can doubt that it is a great cause of the spread of the disease under consideration. Again, on board a ship not only is ventilation comparatively imperfect, but also the admission of sunlight is very limited, in some places no light being allowed at all, and as a consequence the floors, scrubbed with sea water, require much time before drying. Such being the unhealthy conditions on board a ship or boat, the virus that flies about from the breath of the patient, or the dried virus coming from the spittle with

which clothes or other articles may be soiled, will find most favorable conditions of existence. How great the peril is of those who crowd together in such places, the best suited for the preservation of the virus, can well be imagined. The fact that the sea water does not easily destroy the life and virulence of the tuberculosis bacilli, but on the contrary, is favorable to them, has been well established by numerous experiments. Besides, the sudden and striking changes of temperature to which seamen at large have usually to expose themselves, are far greater than those experienced by men in the army when on march. This also naturally affords a great cause for diseases of the respiratory system, and consequently for phthisis; and this is especially the case with the stokers.

Lastly, a ship's crew will often go on shore and lodge at private houses and indulge in drinking and other unhygienic practices. This greatly diminishes the resisting power of the body, and thus opens the way for the entrance of the bacilli, which is almost the same as promoting the power of the virus. These heedless practices of the men must be regarded as another great cause of this dreadful disease. Even those who are ordinarily good in deportment and do not indulge in such unhealthy practices, are apt to lodge at various houses, and otherwise expose themselves to unfavorable circumstances, as naval men lead a more unsettled life than men belonging to the army.—*Surgeon L. W. Curtis.*

MACDONALD, DR. T. P. **Tropical lands and white races.** *The Journal of Tropical Medicine and Hygiene*, May 1, 1908, p. 139.

In this most interesting and instructive paper, read before the Society of Tropical Medicine and Hygiene at London on April 15, 1908, the author gives a most cheering account of the progress of the white people of Australia, and supports his arguments for a still brighter future of all the white people in the Tropics by some rather telling facts. Though somewhat optimistic, he is nothing if not practical. For him tropical disease and not tropical climate is the enemy of the white race in tropical lands, as is shown by the reclamation work at Panama, the west coast of Africa, the work in central Africa in connection with sleeping sickness, and the general health conditions of south Africa.

The author lays special stress upon the necessity of leading a natural life in the Tropics. A purely aristocratic settlement in such countries, as is led by merchants and professional men, is inconsistent with hygienic principles. He emphasized the great fact that the life-giving force derived from manual labor is the principle to be emphasized in forming opinions as to the future of our race in tropical lands.

In Australia, for instance, opposition to the main contention of the people that they could and would perform all work of a tropical nature has disappeared; the question is a thing of the past, and a deep thrill of hope has gone through the land that the Anglo-Saxon people will reach the culmination of its destiny in the Tropics. Example:

Sugar grown by white labor in Queensland:

Year.	Tons.	Bonus.
1903	221, 776	£50, 454
1904	379, 884	85, 211
1905	500, 910	111, 550
1906	1, 197, 433	272, 038

Wherever white men were employed alongside of Chinese, Japanese, and Kanakas, they not only did more and better work but suffered less from sickness than did the others.

An interesting question is brought out as to color origin. The author asks the question: If color is produced by adaptation to sunlight and other climatic conditions, why are the Eskimos brown in their arctic environment, the Finlanders dusky, the Indians red, the Maoris black, the Galla natives on the line white, the Line Islanders the more pale of the Melanesian races, the Fuegians black? The author agrees with Reclus and other geographers who have exploded the fallacy that pigmentation is caused by sunlight, and advances the theory that pigmentation corresponds to the place in time of race evolution; that the blackest skins are found in the most primitive peoples and that between the coal-black skin of the chimpanzee and that of the white race we have a spectrum of color, according to the degrees of lightness in shade, correctly indicating the age of the race. Pigment, he says, is dissolved out of the skin by time, and climate plays no part in the operation.

If competition is the life of trade, harmony is the soul of science. If the arguments of the author are correct, they would mean an enormous expansion of all institutions engaged in medical teaching, especially tropical medicine.

The difficulties as to funds for enlarging tropical schools of medicine will disappear, it is argued, as soon as governments, chambers of commerce, guilds, trade unions, and other social institutions will know what it means to have a population in the Tropics living at a hundred-fold higher consuming ratio than that of the ordinary eastern races. Commerce, great as it is, would be doubled in a very few years.

Land in the Tropics worth now £1 per acre would jump to £30. These, he says, are not fancies but facts which happened in Queensland quite recently.—(H. G. B.)

Sanitary report on the operations of the naval expeditionary corps in southwest Africa in 1904-5 and in east Africa in 1905-6. By the Medical Division of the Imperial Navy Department, Berlin, 1908: Ernst Siegfried Mittler und Sohn.

When it is considered how difficult the work of the medical officers was and must have been under the primitive conditions under which the two expeditions into east and southwest Africa had to be under-

taken, the present report can only excite surprise and admiration. It testifies to the excellent organization of the medical service, the ready adaptability to unforeseen conditions, and the steady, enduring devotion to duty under the most trying circumstances. No mere abstract could do justice to this report, which must be read in detail to be appreciated.

I. *Southwest Africa.*

The Hereros rose in rebellion against the German Government in January, 1904, and on the 21st of the same month the first expedition, formed at Kiel (?) and from the men of *H. M. S. Habicht*, was on its way from Kiel and Capetown to southwest Africa.

A careful selection of the most able-bodied and physically fittest from among the men was quickly made and those inclined to skin diseases and footsores were rejected. The usual blue uniform of the sailor was exchanged for one more suitable to a tropical land climate. The entire complement consisted of 30 officers and 640 men, among which were 2 officers and 33 men belonging to the sanitary column.

Altogether, there were actively employed on shore 7 sanitary officers, 13 sanitary men (hospital corps men) and 24 litter bearers. The equipment of surgeons with personal pocket cases (army pattern), and of the hospital corps men with first-aid material; of quinine in tablet form and ready-made solutions for hypodermic use, in small glass tubes, are especially mentioned.

The expedition was supplied with an amount of medical and surgical material corresponding to one year's supply for a battle ship with 650 men. As field hospitals, 3 Docker's barracks, completely equipped, were provided, with an additional tent for communication between the others. Stores of provisions, carbonated water, wine, etc., were also taken; finally 12 stretchers.

Bags of sailcloth for carrying water on the march were provided on account of the anticipated difficulties as regards the drinking water supply.

The packages for the sanitary material were kept divided in small lots on account of the easier transportation in this form.

The steamer *Darmstadt* with the expedition on board left Kiel (?) on January 21, stopping at Funstal to take 20 oxen on board for drawing machine guns, and arrived at Swakopmund February 9. By February 12 the entire expedition was already on the march.

CONDITIONS INFLUENCING THE HEALTH OF THE TROOP.

Climate and country were the determining factors of influence on the health of the troop. The expedition after passing from shore to a height of 1,200 to 1,400 M. (3,600-4,200 feet) above sea level found itself upon a vast plateau, poor in trees and overgrown with prairie grass, interrupted now and then with thorny bushes, preventing the view into the distance. Cliffs of rock were also frequently seen.

CLIMATE.

At the end of February and in March the nights began to be cold. While the temperature in the middle of the day was very high and summerlike at night it often reached zero and below, going down to 6 to 8° C. Dust storms were not rare.

PROVISIONS.

The supply of provisions was difficult on account of the distance of the supply depots, the slowness of their transportation, and the frequent operations of the Hereros on the supply wagons.

WATER SUPPLY.

During the rainy season the supply was sufficient. During the dry season the supply was insufficient, especially among the troops in the field, that were dependent on surface water and water holes, often found stacked up with dead animals.

PURIFICATION OF WATER.

Water filters became quickly impervious and the best means remained the addition of alum for clearing purposes and the subsequent boiling of the water. The water sterilizers of Kade and the apparatus of Riebschel-Henneberg were useless in the field.

HEALTH OF THE MEN.

In consequence of these trying conditions under forced marches and hard work, the health of the troop suffered quite perceptibly. During fifteen months there occurred 229 cases of typhoid in the troop, or 272.9 per 1,000. Typhoid heads the list, then comes intestinal diseases, then malaria, next heart disease, and last of all injuries. The greatest enemy, therefore, was disease.

II. *East Africa.*

At the rising of the natives in east Africa, it became at first a question of protecting districts situated near the coast. Men were landed from the various cruisers in the harbor of Daresalam, and, after the arrival of more troops from Germany, the total strength operating on shore consist of 227 men. The conditions of climate and country seem to have been, according to the report, somewhat more favorable than they were in west Africa, although essentially the same. The admissions to the sick list exceeded those on the ships on the African station. The causes are attributed to imperfect berthing, poor diet, and insufficient water supply of the troops, as much as to the season and the locality. Unlike to what occurred in southwest Africa, where typhoid headed the list of diseases, malaria claimed the greatest number of victims in east Africa. Both quinine prophylaxis and mechanical protection were employed, but of course under the circumstances were difficult to carry out in detail.

The report is richly illustrated by a large number of statistical tables, showing the course the various diseases took and the duration of each. The service of the sanitary officers was rendered more difficult than usual, especially for the reason that they often were ordered to assume the duties of the military branch of the service in addition to their own.

The report is of especial value in that it gives us in detail an idea of what such an expedition means, what to provide for, how to equip it for such service, what emergencies to provide against, and what diseases to combat. It shows us also that there are difficulties connected with such expeditions that simply must be faced and that no amount of foresight can provide against nor overcome.—(H. G. B.)

SESTINI, DR. LEONE. Growth and naval military service. (A note on military **Anthropometry**.) *Annali de Medicina Navale e Coloniale*, 1908, Vol. II, Fasc. II, p. 165.

The study of influence exerted by naval military conditions of environment upon bodily growth and development in various dimensions has always been one of great interest and will continue to be

one of ever-increasing importance as time goes on and as the navies of the world themselves increase in numerical strength and in the scope of the functions with which they are charged by their respective governments.

Sestini has added a valuable contribution to this most interesting chapter of naval hygiene, notwithstanding the fact that his deductions had to be made from material lacking the numerical strength to make them absolutely convincing—a fault adhering to almost all naval medical statistical work—and in spite of the further unavoidable difficulty that he had no normal growth curve with which to compare his observed facts.

The material from which his deductions were made was derived from the annual enlistment record of all the men and boys whose examinations are made in March of every year, their measurements in the various dimensions recorded, during their four years of compulsory service in the navy.

Limiting himself to the figures recorded on these records he found, taking height, weight, and chest circumference alone, that the changes during the four years of enlistment to be noted were as follows:

Of the number examined, 82.5 per cent showed an increase in chest circumference, 75 per cent had increased in weight, and 52.5 per cent in height. Twenty per cent had decreased in weight, 7.81 per cent in chest circumference, and 6.25 per cent in height. No changes were observed in height in 41.25 per cent, in chest circumference in 9.69 per cent, and as regards weight in 5 per cent.

Applying, moreover, the various ratios existing between chest circumference and half height and between weight and height and then comparing the result as found at the time of the enlistment of the men with those found at the expiration of their enlistment, notable improvements were shown to exist and as having occurred during their enlistment period, making in every detail for a better and stronger physique.—(H. G. B.)

VALENCE, DR. A. (médecin principal de la marine.) **A study in measurements of cadets at the naval school.** Arch de Médecine Navale, March, 1908, No. 3, p. 161.

Doctor Valence undertook to investigate the growth problem of the cadets at the naval school, especially of those on board the schoolship *Borda*. He incidentally subjects to a critical study various indices derived from the relationship between height, weight, and chest circumference, and finds that they are all more or less without value if not altogether leading into grave errors when used as indications for

either the acceptance or the rejection of candidates, especially so when the ages of the candidates are left out of consideration. He attaches, however, great importance to a periodical weighing of all cadets.

The index of Pignet, which = height — (weight + chest circumference), while permitting a comparison of boys of the same age, is of no value in comparisons of different ages. The value of the numerical index of Thémoïn, as an index of robustness, is still smaller than that of Pignet. Thémoïn simply adds height, weight, and chest circumference together.

To show that these formulas are of little value when applied to the examination of the tuberculous, and where such an examination should at least have aroused suspicions, he gives the result of an examination of a tuberculous subject, definitely returned for good and all to his family, on his arrival on board the *Borda*.

Age.....	18 years.	} Index-Pignet = 25.5 } Average con- Value Thémoïn = 3.065 } stitution.
Height.....	1.66 meters.	
Weight	57 kilograms.	
Chest circumference...	83.5 centimeters.	

Among some of his conclusions are the following:

1. The two measurements prescribed by regulations are not sufficient to determine with exactness the development of the cadets at the naval school.
2. An estimate of the physical value during the period of growth can not be obtained through any arithmetical formula.
3. The numerical index of Thémoïn, still less than the coefficient of strength of Pignet, serves as no means for the appreciation of vital force.
4. No numerical formula can serve as a basis for the rejection or the acceptance of a candidate for the naval school.
5. A rational gymnastic system contributes to growth, maintains the general health, and increases chest capacity.—(H. G. B.)

DAAE, MAJOR (medical corps of the Norwegian army). On growth in height of youths serving their time in the army. *Deutsche Milit. Zeitschrift*, September 5, 1908, p. 721.

Studies on height have resulted in showing that the Norwegians are one of the tallest, if not the very tallest, people in Europe. The average height of the recruit (23 years) is 172 centimeters, but differs for different parts of the country. In the northern districts (between 62° and 69° north latitude) the average height is greatest, namely, 175 centimeters. The classification according to height is as follows: "Small, under 162 centimeters; below the mean, between 162 and 170 centimeters; mean, 170 to 180 centimeters; tall, over 180 centimeters."

The height of the Norwegian is constantly on the increase, amounting to 1 centimeter per decade. The measurements of the height of recruits 23 years of age show an increase on the average of 1 centi-

meter over that of those 22 years old; they have grown during that year 1 centimeter. Growth, however, does not stop at the 23d year of age. The measurements of 1,284 soldiers who were measured for height when 22 years old and, again, when 28 years old, showed that 83.41 per cent had grown on an average 1.64 centimeters; 10.52 per cent remained the same, and 6.07 per cent had become smaller.—(H. G. B.)

WENDT, DOCTOR. The value of fencing as a sport from hygienic and ethical points of view. *Marine-Rundschau*, November, 1908, p. 1289.

Basing his argument upon the present very intense struggle for existence and the absolute necessity for a most exclusive devotion to one's trade or profession to be successful in the competition for even the mere necessities of life, the maintenance of general health and of a good all-around physical condition requires exercise in some good sport. Generally there is neither time nor inclination nor even a seeming opportunity for such exercise, until some breakdown has taken place, until the preventable mischief has been done and physicians are called in to begin the patching up of a broken-down constitution.

The author points to the navy, and more especially to the officers of the navy, where such a sport is more particularly desirable. He realizes that the conditions of service on board ship make it difficult for officers to take enough of the necessary exercise to maintain them in such a physical condition as to enable them to perform the duties required of them. Exposure to winds and weathers, to changes of climate and temperature, causing disturbances in the heart's action, in digestion, general nervous fatigue and exhaustion must finally lead to lack of endurance and physical service unfitness. Nothing but the steeling of the body against such influences by daily exercise can prevent such general breakdowns.

The author sees in fencing the most fitting sport for naval officers, the one best adapted to the conditions under which they must do their duty; he hails with delight the formation of a fencing club at Wilhelmshafen, in which every member receives instruction by an expert fencing master and where he can take his exercise several times a week. The benefits of the exercise of fencing upon the entire human organism are traced out to perfection and shown to be in the most perfect harmony with what naval officers stand in the most pressing need of, when at sea especially.

The ethical effects of the exercise in fencing make for cleverness, for strength and agility, give confidence, and abolish awkwardness.—(H. G. B.)

DELMORE. On the significance of the ophthalmic reaction for the army. From an abstract quoted by Buttersack (Berlin), *Deutsche Militärärztl. Zeitschrift*, November 5, 1908, p. 928.

Delorme, in a paper read before the Academy of Medicine at Paris, January 21, 1908, concludes that the use of the ophthalmic reaction, as a decisive means in diagnosis, would cause the army to be considerably reduced—to be ruined. He sums up his conclusions as follows:

1. The first great enthusiastic reception of tuberculin as a means of diagnosis was followed by a general feeling of conservatism.
2. Both the ophthalmic reaction as well as the cutaneous reaction may be scientifically correct, but they are of value in the diagnosis only when they are in harmony with other symptoms of the disease, otherwise they are misleading.
3. The large number of erroneous interpretations to which the tuberculin reactions give rise are sufficient reasons for contraindicating their employment by army surgeons.
4. The local injuries to the eyes produced by them would, further, argue against their use.
5. The influence of such a test on the man himself may result in a psychic depression that may be more or less permanent because of his understanding of its meaning.

It is the same with this test as with many others of the same character; while scientifically correct, they can never be permitted to establish a diagnosis of the disease without a proper consideration of all the other symptoms.—(H. G. B.)

SALOMONE, G. E. BELLI, C. M. Ematuria da un parassita affine allo *Schistosomum hæmotobium*. (Hematuria caused by a parasite akin to *Bilharzia*.) *Annali di Medicina Navale e Coloniale*, 1908, Vol. II, Fasc. II, Agosto, p. 181.

The authors of this interesting paper describe with great thoroughness and scientific detail the history of a patient afflicted with hematuria, contracted, in all probability, in the harbor of Rio by bathing in and also by drinking infected water.

The parasite, of which mere fragments were discovered, closely resembles a *Schistosomum*, unlike any so far recorded and described. The authors question the fact that *schistosomum* should not be endemic in Brazil and the circumstance that Brazilian physicians, while looking for *schistosomum hæmotobium* in urine, found *filuria* instead, is not necessarily conclusive argument against its existence there.

Nor do the authors agree with Loos in what the latter says with regard to the improbability of the embryos of *bilharzia* entering by way of the mouth, on account of the existence of experimental proof of the fact that the miracidia do not survive three minutes in a 0.5:1000.0 solution of hydrochloric acid. The large quantities of

water that are taken in tropical climates would tend to cause such a dilution of the gastric juice as to bring it far below the limit mentioned above and would cause the water to pass on quickly into the small intestine, where it would mix with alkaline contents. The fact that the patient also frequently bathed in the harbor water renders, besides, infection through the skin possible.

The exemplary accuracy with which this case has been studied by these authors would render the existence of some species of schistosomum in the waters of Rio highly probable and will probably induce new researches to be undertaken in the near future with the view of becoming better acquainted with this new parasite.—(H. G. B.)

STATHAM, J. C. B. (major, royal army medical corps). **The complex nature of typhoid etiology and the rôle played by animals and man in the spread of the typhoid group of diseases.** *Journal of the Royal Army Medical Corps*, October, 1908, p. 351.

The author holds that typhoid is a group disease, produced by a group of organisms. All the members of this group have in common certain staining reactions (decolorized by Gram's method) and certain sugar-fermenting properties. Although these latter differ somewhat among the individual members of the group, they all produce a typhoid-like disease and the Eberth bacillus can not now be considered the sole producer of the disease. To the group of bacilli having etiological relationship to enteric fever in man the author places not only the *B. paratyphosus* "A" and "B," but also the hog cholera group, *B. morbificans bovis*, *B. psittacosis* and *B. typhimurium*. He holds that in typhoid we have a disease of protean nature which may be induced by any one of several groups of allied but distinct bacteria.

Typhoid bacilli have been found in a splenic abscess of a cow and in a few instances in the tissues of cattle (Levy and Fornet). *B. paratyphosus* "A" has been isolated from the intestines of many domestic and other animals—dogs, pigs, guinea pigs (Morgan). Bacteria belonging to the large group of *B. paratyphosus* "B" have been isolated from suspected meat and from affected persons, and the blood sera of the patients have been found to agglutinate these bacteria, proving the source of the disease to be infected meat. Finally, *B. coli communis*, a common, widespread organism, present in the intestinal tract of most animals, also produces gastro-enteritis and a disease like typhoid in man.

The author calls attention to the fact that bacteria similar to those which cause typhoid disease in man are the common producers of animal diseases also; further, that man may be affected by gastro-enteritis or typhoid fever by partaking of the meat of such diseased ani-

mals. He also claims to have shown that animals closely associated with man, such as farm animals, horses, dogs, parrots, mice, etc., are all liable either normally or when diseased, to harbor bacteria in their intestinal tracts or tissues which may set up typhoid disease in man.

The part played by man in the spread of the disease is in part due to the typhoid-infected gall bladder of people who have long since recovered from an attack. Bacillurea also may last for months after an attack. Thus man himself becomes one of the principal distributors of typhoid from person to person. Endemic typhoid must be looked upon as contracted from typhoid houses and typhoid carriers. In domestic life the possibilities of typhoid spread from the handling of bread alone must be very great, and the origin of more than one epidemic of typhoid has been traced to milk infected by bacillus-carrying cow milkers. Finally, the author advances the theory of a possible auto-infection in man, saying:

We know that there are often in the intestinal tract of healthy people bacteria capable of causing typhoid. Why should not such a person, when for some reason his vitality is lowered, contract the disease? Diphtheria, pneumonia, boils, and abscesses are largely due to auto-infection, following lowered bodily vitality; why not enteric?—(H. G. B.)

MARTINI, Prof. Dr. (marine-oberstabsarzt, Tsingtau). *Amœbæ carriers*. Arch. f. Schiffs und Tropen-Hygiene, 1908, Bd. XII, heft 18, p. 588.

In a patient affected with amœbic dysentery the middle of September, 1907. *entamœba histolytica* schaudinn was found and the disease behaved, in all respects, like a serious case of dysentery. The patient lost 20 pounds in weight between September and December, but the treatment instituted was successful and he recovered his health completely by next December. At the end of January, 1908, his feces showed red streaks of a mucous-like jelly, which proved to be clusters of amœbæ filled with red blood corpuscles and this in the midst of the enjoyment of the best of health. The author concludes from this experience that many such cases may walk about, especially in China, spreading the disease. He would, therefore, recommend that all those whose feces show traces of blood should be examined for the *entamœba histolytica*; their stools disinfected in order to prevent the spread of this disease by flying insects and through direct contact.—(H. G. B.)

REPORTS AND LETTERS.

ANNUAL MEETING OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

Pharmacist Alrik Hammar, U. S. Navy, represented the navy at this meeting, which was held at Hot Springs. Ark., September 7 to 12, 1908, and reports in part as follows:

The meeting was called to order by President W. M. Searby, of California, at 10 a. m. September 7. There were present about 227 members and delegates, representing nearly all the States of the Union, the Government being represented by two delegates from the Marine-Hospital service, one from the Department of Agriculture and one from the navy. In the address to the association emphasis was given to the efforts of the Surgeon-General of the Navy to advance the interests of pharmacy in that department, as shown by his endeavors to secure for naval pharmacists the grade of chief pharmacist and the official recognition which the profession has received in the *NAVAL MEDICAL BULLETIN*.

The following extract from the address of the president of the association merits special attention:

I have to again call your attention to the unsatisfactory position of pharmacists in the service of the United States Government. Most of the medicine used in the army and navy is dispensed by enlisted men without pharmaceutical qualifications. While the Federal Government has taken radical action to prevent injury by the use of adulterated drugs and foods by interstate legislation, and nearly all the States have enacted laws of similar import, and also to prevent the dispensing of drugs and medicines to the most useless citizens by ignorant or incompetent persons, the men in our army and navy, who have placed their health and lives at the service of their country, have no such protection, but are required to accept their medicines at the hands of unqualified dispensers. The pharmacists, properly so called, in the navy number only 25, and are all employed at shore stations.

After the session concluded I requested the president to strike out the words "and navy" on line 3 and line 11, stating that the present conditions of the hospital corps did not warrant such assertions, that he, the president, had been misinformed. Further, that the Surgeon-General of the Navy had established such rigid examinations for the rating of hospital steward that those holding that position were fully competent and qualified to dispense drugs and medicines. The presi-

dent graciously ordered these words stricken out and so instructed the members of the press and others.

After the reading of the report of the committee on the status of pharmacists in the Army, Navy, and Public Health and Marine-Hospital Service, the following resolutions were introduced and passed:

Whereas in nearly all the branches of the United States Navy the warrant officers, after six years' service, are promoted to chief grade, with pharmacists as an exception:

Therefore, be it resolved that this association earnestly indorses the efforts of the Hon. Victor H. Metcalf, Secretary of the Navy, and of Dr. P. M. Rixey, Surgeon-General of the Navy, to secure for naval pharmacists the grade of chief pharmacists, and heartily approves such further recognition of pharmacists in all the branches of the public service as will bring them into fuller professional recognition in regard to their responsibilities and the increasing scientific requirements demanded by our national laws.

And be it further resolved that a copy of this resolution be sent to the President of the United States, to the Secretary of the United States Navy, and to the Surgeon-General of the United States Navy.

The following extract from the report of the committee on the national formulary is of interest to the service:

It was deemed advisable, however, to secure the future cooperation and advice of the medical profession and of the medical departments of the National Government, and we recommend that the American Pharmaceutical Association, through its properly constituted officers, request the chief of the bureau of chemistry, the Surgeon-General of the Army, the Surgeon-General of the Navy, and the Surgeon-General of the Public Health and Marine-Hospital Service, to cooperate in the work of revision by supplying such suggestions for additions, corrections, and eliminations as may be brought to their attention through or by the physicians and pharmacists engaged in these several services; and that the chief of the bureau of chemistry of the Agricultural Department and the Surgeon-General of the Public Health and Marine-Hospital Service be requested to assist in such laboratory work as may be necessary to improve and perfect the national formulary, and in providing such tests of identity and purity as may be necessary. We suggest that the interest and cooperation of the medical profession in this work may be best secured through the joint conference committee proposed and provided for by the American Medical Association at the recent meeting of that association in Chicago.

The meeting was adjourned on September 12, after the election and installation of officers for the ensuing year.

REPORT OF AN EPIDEMIC OF TYPHOID ON THE U. S. S. MAINE.

By Surg. M. S. ELLIOTT, U. S. Navy.

Soon after the departure of this ship from Hampton Roads seven cases of febris enterica developed. All gave a history of probable exposure to infection at Philadelphia, while the ship was at League Island. These cases were admitted to sick list between the dates December 13, 1907, and January 1, 1908. The case admitted on Janu-

ary 1 had been sick some days before reporting at sick call. Two of these cases were transferred to hospital at Trinidad, one died from perforation as demonstrated by autopsy, and the other cases were returned to duty. Diagnosis was confirmed in five cases by Widal reaction, using the sterile emulsion. In one case, a very mild one, in which the diagnosis was uncertain, the reaction was negative. Two of the above cases during convalescence developed phlebitis of the femoral and popliteal veins. One of these cases later developed a complete paralysis of the right lower extremity.

Soon after leaving Rio de Janeiro on January 22, and on entering cooler latitudes, a number of cases of an uncertain character developed, but partaking of the intestinal and nervous form of catarrhus epidemicus, and were diagnosed as such. Forty cases were admitted during January, February, and March; a number of these cases developed a severe broncho-pneumonia and ran a protracted course with a continued temperature. In all cases in which the temperature was continued the case was treated as one of typhoid, and all precautions taken to prevent the spread of the disease. The Widal reaction in these uncertain cases was negative. About 25 of the 40 cases of catarrhus epidemicus and broncho-pneumonia, diagnosed as such, were mild and the patients were returned to duty in the usual period of time. The symptoms of these mild cases and of the severer cases in which typhoid was suspected, were unusual and not of the ordinary type, and were the same in all cases. All the suspicious cases had been ashore in Rio and were admitted to sick list between the dates of January 26 and February 18; of the serious cases the diagnosis of typhoid was confirmed (in one on transfer to the *Relief*), and three other cases were undoubtedly typhoid, although Widal reaction with sterile emulsion was negative.

Between the dates March 15 and April 4 four cases of typhoid were admitted to sick list and were transferred to the *Relief*. Two suspected cases were also admitted. Diagnosis was confirmed in the four cases above by a positive Widal. The symptoms in these cases were more suggestive of typhoid, and with one exception, in which the diagnosis was positive, all had been ashore at Callao within the period of incubation. One case had not been ashore since January 18, in Rio.

On May 6 one case was transferred to naval hospital, Mare Island. Diagnosis confirmed by positive Widal. He had been ashore at several ports within period of incubation. On May 22 another case in which it was too early to arrive at a diagnosis was sent to hospital, and at present (May 27, 1908) there is one case under treatment which was admitted to sick list on May 22, and which is suggestive of typhoid. Both of these cases have been on liberty frequently within period of incubation.

The cases may be roughly divided into three groups: The one developing after leaving League Island; the second after leaving Rio; and the third after leaving Callao. The last three cases had all been ashore since reaching the United States on April 14. Several of the cases had not been off the ship for at least a month previous to being taken sick, although all of them had been ashore at Rio. The cases which developed after leaving Callao, with one exception, had been ashore within the period of incubation. Between the appearance of the other two cases there was an interval of thirty-one days—from April 4 to May 6.

The cases, both positive and suspected, were not confined to any one part of the ship, being scattered generally throughout the messes.

Since the appearance of the first cases all precautions have been taken to prevent the spread of the disease. The latter part of December the water tanks were thoroughly cleaned and cemented. All bed linen, dishes, etc., are disinfected before being used. The seats in the crew's head are washed daily with a bichloride solution.

On May 13, a few days after the arrival of the ship at Mare Island and after the development of a case thirty-two days later than the previous one, a letter was addressed to the commanding officer stating, "that in view of the fact that a number of cases of typhoid fever have developed from time to time on this ship during the past three months and that there is some possibility that the source of infection exists within the ship, which has not been determined, I have the honor to request that a board of medical officers be appointed to determine if such source does exist and to recommend means for the prevention of the further spread of the disease."

The board, of which Medical Inspector Frank Anderson, Surg. H. E. Odell, and Asst. Surg. F. H. Stibbens were members, met on board on May 14, and after investigating the conditions made the following report:

The cases developed in three groups and in each instance followed the visit to some port where liberty had been given. From the manner in which the disease developed, from the small number of cases considering the size of the crew, and especially from the fact that no commissioned, warrant, or chief petty officers have been attacked, we believe that shore infection would in each case account for the appearance of the disease. We see no reason at present to consider the vessel itself infected and we have no precautionary measures to recommend other than already adopted by the medical officer of the ship.

On May 13 and 14 every fresh-water tank in the ship was sterilized with live steam and cemented.

Since the appearance of the cases the water supply has always been under observation. The sick bay and bathroom in addition to the usual cleanliness and scrubbing has been disinfected with formaldehyde gas. None of the cases which were returned to duty, with

one exception, who for a short time was mess cook, were allowed to attend to mess duties.

At the suggestion of one of the members of the board, blood smears were taken from 23 cases which were considered suspicious and who had been returned to duty and were still on the ship; they were sent to the naval hospital for the Widal test with a live culture. Of these 23 cases, 4 reacted positively, and of these 4, 2 gave a history of having had typhoid previously, 1 four years ago and the other ten years ago. The third positive was that of one of the hospital apprentices. Nearly all of these 23 cases were among those which developed after leaving Rio and in which the diagnosis was uncertain.

REPORT OF AN EPIDEMIC OF GRIPPE ON THE U. S. S. CHARLESTON.

By Surg. M. F. GATES, U. S. Navy.

On January 14, 1908, at San Diego, a well-marked case of gripe and a second case, originally entered as laryngitis acuta, but of grippal origin, appeared and were followed by other cases on the 15th, 16th, and 17th. As no other cases had appeared for some months, an effort was made to limit the spread of the infection by isolation to as great an extent as practicable.

On January 18, on arrival at Magdalena Bay, and the subject having been verbally discussed with the commanding officer, a letter was written recommending the establishment of a camp on shore and isolation of cases. Six cases had then appeared, and some of them were convalescent. Three days later the authorization of the commander in chief was received, and permission of the local authorities being promptly granted, a convalescent camp was established the same day. Meantime the number of cases had increased to 15, and isolation on board was necessarily very incomplete. Thirteen cases, together with a hospital apprentice, first class, were transferred to the camp that day. On the 22d three cases were admitted; on the 23d, one; 24th, four; 25th, one; 26th, one; 27th, five; 28th, one; 29th, four; February 3, one; 9th, one; 10th, two; 13th, two; 15th, 16th, 19th, 22d, and March 7, each one; after which no cases appeared for seventeen days, i. e., eleven days after arrival at San Francisco. From the *Preble* four cases were admitted. The first was a Japanese cook, the intimate friend of a Japanese steward on the *Charleston*, who had one week previously been admitted as with catarrhus bronchialis, but who afterwards showed Pfeiffer's bacillus. The second was admitted eleven days later, the third twenty-three days after the second, and the fourth ten days after the third. These cases were transferred to this ship. The third and fourth were retained on

board, in isolation, nine and eight days, respectively. The earlier cases were sent to camp.

In many cases the source of infection could apparently be traced, as in that of the cook mentioned above, and two mess attendants infected from the steward. Four men from the band were attacked, all in the first six days of the epidemic. Thirty-one days after the first case a hospital corps man who had come intimately in contact with the cases was attacked, nine days afterwards a second, and fourteen days later a third was seized.

These two hospital corps men were the last cases of the *Charleston* group, no other cases appearing for seventeen days.

Four cases in which special symptoms predominated were originally admitted as with rhinitis acuta, catarrhus bronchialis, and laryngitis acuta, and were later transferred to the camp, the presence of Pfeiffer's bacillus having been microscopically determined.

One well-defined case occurred in an officer; another entered as "neuralgia" was probably grippal, but was not microscopically verified. They were not transferred, and isolation was defective.

I greatly regretted the delay in getting authority to land the men, and believe that more prompt isolation at an earlier stage, suspicious cases being included, would have reduced the number attacked. As it is, I consider the result satisfactory, and believe that when reasonably prompt and complete isolation is practicable, it should be carried out in this disease. The climate of Magdalena Bay is exceptionally fine, although some unusual storms occurred during the existence of the camp, and the cases progressed in a very satisfactory way; fever and cough quickly subsided and strength was rapidly regained. The patients were kept in isolation for about a week after subsidence of marked symptoms, the total period ranging from eight to nineteen days.

In most cases bacterial examinations were made after their return, as well as before going to camp. The bacillus was usually found persistent, and antiseptic douches and gargles were employed for a week or more after their return.

The mild cases, showing such slight symptoms that some men with them will not apply for treatment, and are, therefore, overlooked, and the persistence of the organism for an indefinite period after recovery, furnish the difficult problems in checking such an epidemic by isolation.

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NO. 2

V. 65
VOL. 3

UNITED STATES NAVAL MEDICAL BULLETIN

FOR THE
INFORMATION OF THE MEDICAL
DEPARTMENT OF THE SERVICE



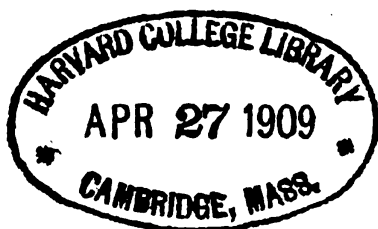
LIMITED TO PROFESSIONAL MATTERS AS OBSERVED BY MEDICAL
OFFICERS AT STATIONS AND ON BOARD SHIPS IN EVERY
PART OF THE WORLD, AND PERTAINING TO THE PHYS-
ICAL WELFARE OF THE NAVAL PERSONNEL

APRIL, 1909

(ISSUED QUARTERLY)



WASHINGTON
GOVERNMENT PRINTING OFFICE
1909



NAVY DEPARTMENT,
Washington, March 20, 1907.

This United States Naval Medical Bulletin is published by direction of the Department for the timely information of the Medical and Hospital Corps of the Navy.

TRUMAN H. NEWBERRY,
Acting Secretary.

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PREFACE.

The publication and issue of a quarterly bulletin by the Bureau of Medicine and Surgery contemplates the timely distribution of such information as is deemed of value to the medical officers and the hospital corps in the performance of their duties, and with the ultimate object that both shall continue to advance in proficiency in respect to all of their responsibilities.

It is proposed that the Naval Medical Bulletin shall embody matters relating to hygiene, tropical and preventive medicine, pathology, laboratory suggestions, chemistry and pharmacy, advanced therapeutics, surgery, medical department organization for battle, and all other matters of more or less professional interest and importance under the conditions peculiar to the service and pertaining to the physical welfare of the naval personnel.

It is believed that the corps as a whole should profit, to the good of the service, out of the experience and observations of the individual. There are many excellent special reports and notes beyond the scope of my annual report being sent in from stations and ships, and by communicating the information they contain (either in their entirety or in part, as extracts) throughout the service, not only will they be employed to some purposes as merited, but all medical officers will thus be brought into closer professional intercourse and be offered a means to keep abreast of the times.

Special attention will be given by the instructors of the Naval Medical School to the review of advances in medical science of special professional interest to the service, as published in foreign and home journals, and extracts from these will appear in the bulletin, together with such remarks as the instructors may deem of value to officers on foreign service or sea duty.

Information received from all sources will be used, and the Bureau extends an invitation to medical officers to prepare and forward, with a view to publication, matter on subjects relating to the profession in any of its allied branches.

P. M. RIXEY,
Surgeon-General, U. S. Navy.

(vii)

SPECIAL ARTICLES.

TREATMENT OF TUBERCULOSIS AND THE RESULTS OBSERVED DURING THE YEAR 1908.

(At the United States Naval Hospital, Las Animas, Colo.)

By Surg. B. L. WRIGHT, U. S. Navy.

In submitting this report Doctor Wright calls the attention of his readers to the fact that the number of medical officers constituting the hospital staff has been much below that which was necessary to properly carry on the important undertaking of such an institution. Nevertheless, the services of the present staff have been of the highest order, and the work accomplished is the result of commendable energy and untiring devotion to duty under most trying conditions.

The routine treatment of all patients has been that which is observed in all sanatoria, embracing the principles of outdoor life, maximum amount of fresh air, rest, food of proper quality and amount, and general and personal hygiene, etc.

The special treatment pursued has consisted in *deep muscular injections of mercury* as hitherto reported. This method of treatment was instituted in January, 1908; consequently, about one year has elapsed since the first case so treated, which may be reasonably considered a sufficient period of time for noteworthy observations and a determination of the importance of the results obtained.

The acceptance of this method of treatment has, we desire to re-iterate, been left entirely to the will of each individual patient, and this is still the practice to-day. At the present time 92 of the 127 patients in the hospital are voluntarily taking the mercurial treatment.

During the past year 161 patients have remained in hospital two or more months; of these, 83 voluntarily took the injections of mercury and 78 preferred to remain upon the routine treatment. The following carefully prepared statistical report presents a comparison of results obtained from the two methods, and it strongly emphasizes the great value of mercury as an antituberculous agent.

	Number of patients who have remained in hospital two or more months.	Those who voluntarily took the mercury treatment.	Those who preferred the routine treatment solely.
Cured	8	7	1
Marked improvement	43	43	0
Improved	16	14	2
Slight improvement	17	10	7
Stationary	19	0	19
Failed	42	4	38
Died	16	5	11
Total	161	83	78

There were 3 additional deaths in the hospital during the year, 2 from typhoid and 1 following operation for appendicitis.

Of the cures, 87.5 per cent took mercury treatment; 12.5 per cent took routine treatment solely.

Of the marked improvement, 100 per cent took mercury treatment; none took routine treatment solely.

Of the improved, 87.5 per cent took mercury treatment; 12.5 per cent took routine treatment solely.

Of the slightly improved, 58.82 per cent took mercury treatment; 41.18 per cent took routine treatment solely.

Of the stationary, none took mercury treatment; 100 per cent took routine treatment solely.

Of those that failed, 9.52 per cent took mercury treatment; 90.48 per cent took routine treatment solely.

Of those that died, 31.2 per cent took mercury treatment; 68.8 per cent took routine treatment solely.

Combining the items cured, marked improvement, improved, and slightly improved, under the heading improved; stationary as such; and combining the items failed and died under the heading failed, the following percentages obtain:

Of the 83 patients on mercury, 89.16 per cent improved; none were stationary; and 10.84 per cent failed.

Of the 78 patients on routine, 12.82 per cent improved; 24.36 per cent were stationary; and 62.82 per cent failed.

The 161 patients considered in this report are classed as follows:

Incipient (first stage).....	1
Moderately advanced (second stage).....	59
Advanced (third stage).....	101
Total number.....	161

In the above cases the following secondary tubercular involvements have been diagnosed clinically: Brain, 1; larynx, 16 (13 ulcerative and 3 infiltrated); larynx and pharynx (ulcerative), 3; intestine, 9; stomach, 1; genito-urinary tract, 3; general glandular, 4; ischio-rectal fistula, 6; and bone, 3.

At post-mortem in the 19 cases, tuberculosis of various organs and tissues was found, as follows: Intestines, 13; left kidney, 9; right kidney, 6; spleen, 7; liver, 4; pancreas, 0; mesenteric glands, 14; heart, 1; left lung, 19; right lung, 19; larynx, 7.

Of the complications existing in these 161 cases, the following were found: Cardiac hypertrophy, 1; mitral regurgitation, 3; tricuspid stenosis, 3; pulmonary stenosis, 2; arteriosclerosis, 5; chronic passive congestion of liver and spleen, 16, of the liver alone, 19, and of the spleen alone, 15; hypertrophic pharyngitis, 1; glaucoma, 1; exophthalmic goiter, 1; malaria, 3; appendicitis, 1; syphilis, 8; displaced kidney, 1; and typhoid fever, 25 cases.

The excellent work of Doctor Clifford in the laboratory has greatly aided the clinical side of the question, and the coordination existing between these two departments has been of great benefit to all.

The examination of the blood of tubercular patients is considered to be of the utmost importance. The white count is a check on the physical diagnosis, these cells being increased in number directly as the stage of the disease. It is also of great value from the standpoint of prognosis, a relatively large increase (from 12,000 to 20,000) decidedly decreasing the chances of rapid improvement.

The routine examination of the feces has lead us to support the conclusions of Rosenberger (American Journal of the Medical Sciences, December, 1907). Conclusions:

1. No acid fast bacillus other than the tubercle bacillus was found in the feces.
2. The presence of the tubercle bacillus in the feces means that active tuberculosis exists somewhere in the body.
3. In acute miliary tuberculosis the bacillus is always present in the feces.
4. In all cases of chronic diarrhea and in cases of glandular involvement the feces should be examined for tubercle bacilli.
5. Finding tubercle bacillus in the feces does not mean intestinal ulceration in all cases.
6. In arrested or healed pulmonary tuberculosis no tubercle bacilli are found in the sputum or the feces.
7. The feces should be studied for tubercle bacilli as a part of the routine examination, especially in suggestive cases, and when no expectoration can be found.

From our investigations along these lines we believe that a further conclusion may be asserted.

We have noticed that as cases of tuberculosis improve the tubercle bacilli first begin to diminish in number in, and finally disappear from, the feces long before this happens in the sputum. Therefore, from a prognostic point of view—

8. Diminished numbers of tubercle bacilli in the feces or their disappearance from the same is positive evidence that the tubercular lesion wherever it may be in the body is undergoing a healing change irrespective of the continued presence in the sputum of the bacillus.

My own conclusions relating to tubercular infection, with which the Medical Department of the navy is somewhat familiar, may bear repetition here.

There are four ways in which the tubercle bacillus may enter the human system, viz. through the intestines, by inspiration, through the tonsils, and through wounds or abrasions of the skin.

Whichever route they select I do not think this invasion is ever followed by a primary tubercular lesion at the point of entrance, but that these bacilli, having entered the tissues, eventually find their way into the blood and lymph (period of incubation), where they multiply and, eventually selecting the least resistant tissue, there produce the

primary pathological lesion (incipient tuberculosis). From this beginning the pathological process extends and the clinical features increase, eventually giving rise to evidences of most profound systemic infection (the disease having started as such), with an increasing area of local involvement around the primary lesion, and, in many instances (always so in advanced cases), more or less numerous secondary involvements of other organs and tissues. Clinical statistics are sufficient evidence of the fact that tuberculosis first manifests itself most often in the right apex, and, though the primary lesion may occur in any tissue or organ, I am strongly inclined to the belief that, having its beginning purely as a general systemic infection, the first pathological changes of the disease take place in the lungs with such frequency that we may exclude primary tuberculosis from any other organ or tissue.

From the statistics relating to the comparative value of the mercurial method, or the purely hygienic routine method of treating this disease, it would seem proper that mercury be adopted as a regular treatment at this hospital, making it compulsory at the discretion of the hospital staff.

LABORATORY STUDIES AND OBSERVATIONS DURING THE YEAR 1908.

(At the United States naval hospital, Las Animas, Colo.)

By Passed Asst. Surg. A. B. CLIFFORD, U. S. Navy.

Since the beginning of regular work in the laboratory, about the middle of April, 1908, some 1,250 examinations have been recorded as follows: Blood, 194; urine, 194; sputum, 678; feces, 140; Widal's reaction, 33; water, 3; milk, 2; ophthalmo-tuberculin reactions, 6.

BLOOD.

Red count.—Our findings are in accordance with statistics, viz, that while tubercular patients often appear pale and anæmic, the blood picture is not that of anæmia as a rule, the red count being high and the percentage of hemoglobin high also. Of our 194 cases the red count averaged 5,799,000, and the hemoglobin 90 per cent. The high red counts are not due to the altitude, as the examinations are made as soon as the patients arrive, but to various factors in the disease which produce concentration of the blood.

White counts.—One hundred and ninety-one were made.

Cells per cubic millimeter.	Number of cases.
5,000 to 7,000.....	7
7,000 to 9,000.....	35
9,000 to 11,000.....	47
11,000 to 15,000.....	59
15,000 to 20,000.....	29
20,000 to 30,000.....	14

In tuberculosis the white count is a very fair indication of the progress of the disease. In uncomplicated cases with but slight involvement the white count varies but little from the normal. In more advanced cases, where secondary infection with other organisms is particularly apt to occur, the white counts become larger; and, as would be expected, the demonstration of the tubercle bacillus is easier.

Among the cases with extensive and far-advanced pulmonary lesions and marked secondary infection or cavity formation, the highest counts are found. In the 14 cases which have died during the time covered by this report, the white counts averaged above 15,000.

Reference to the table of white counts makes evident the fact that a large majority of our cases belong to the second and third classes, namely, moderately advanced, or far advanced. This factor renders the treatment and cure of the disease more difficult, but at the same time makes the results more gratifying when attended with success.

Differential counts.—These show several points of interest:

(1) When the white count is normal there is little if any change in the relative proportion of the white cells from the normal.

(2) In high white counts the polymorphonuclears are increased at the expense of the other kinds of cells.

(3) Mast cells are found very frequently. The records show them in one-third of the cases in percentages from 1 to 5.

(4) Moderate eosinophilia, from 1 to 4 per cent, is very common, occurring in 65 per cent of the cases examined. In the majority of the cases showing more than 4 per cent of eosinophiles, some other cause for it has been demonstrated.

Widal's reaction.—During the typhoid epidemic 33 Widal's were made, of which 21 gave positive and 11 negative results. These tests were made with living cultures obtained from the laboratory in Washington.

Malarial parasites.—These were found in three cases—one from Honduras, one from Panama, and one from New England, though the place of infection could not be determined definitely. They were of the tertian type.

SPUTUM.

Routine followed.—The sputum of each case is examined when admitted. In case the tubercle bacillus is found, the second examination is not made until the patient comes up for a physical examination. If the first examination is negative a fresh specimen is examined each morning for ten consecutive days, or until a positive result is obtained.

Of the 678 examinations recorded, 194 were positive and 484 were negative. On the first routine examination of all the patients in the

hospital, made during April and May, 1908, 25 cases were negative. Ten consecutive examinations in each of these negative cases reduced the number to 7. During the month of December the sputum of all the patients in the hospital was examined, with negative results on first examination in 50 cases. This increase in negative cases was largely, though not entirely, among patients who had been for some time under treatment. Reexamination in these 50 cases has not yet been made, but it is probable that the number of negative cases would be considerably reduced were 10 examinations made in each case.

URINE.

The urine of 194 cases was examined. Casts were present in 53 cases. The far advanced case which does not show casts is exceptional. They were present in all the fatal cases. By the use of Heller's, the nitric acid and the heat tests, albumin was found in only two cases. We are satisfied that if a more delicate test had been used, viz, Purdy's acetic acid and sodium chloride test, a trace of albumin would have been found in many of these cases.

While solitary tubercles are frequently found in the kidney at autopsy, the pathological elements of the urine do not, as a rule, result from tuberculosis localized in these organs, but from the toxemia of the disease. Two cases of genito-urinary tuberculosis are on record. The first one had practically recovered from this part of his disease before the laboratory went into commission. Tubercle bacilli were found in the urine of the second case several times.

FECES.

Parasites.—The feces were examined in 8 cases in which blood showed more than 4 per cent of eosinophiles. In 6 of these cases intestinal parasites were found as follows: Hook worms, in 3 cases; roundworms, in 1 case; whipworms, in 1 case, and flagellates, in 1 case.

Tubercle bacilli.—Early in December we began the examination of stools for tubercle bacilli. No special enriching process was employed. A drop of water was placed on a slide and a particle of the solid or semisolid stool mixed with it to make the smear, which was then stained as in the usual method for sputum—only one examination being made in each case. One hundred and twenty-four cases were examined. In 62 cases the tubercle bacillus was demonstrated; in 62 cases it was not found. Of these 124 cases, the sputum was negative in 50. There were then only 12 cases in this series in which the tubercle bacilli were found in the sputum whose feces did not show the organism on first examination. In all these cases the organisms in the sputa were very few. In several cases the organism was demonstrated in the feces before it was found in the sputum, as it is

not always possible to obtain a good specimen of sputum. It seems to us that the significance of tubercle bacilli in the feces deserves more attention than is usually accorded it in text-books. Some authors pass over it as of no importance. Others dispose of it in two ways: Either the patient has intestinal tuberculosis with symptoms pointing to the bowel as the seat of disease, or he has swallowed his sputum."

An article of great interest by Randle C. Rosenberger, M. D., on this subject was published in the *American Journal of Medical Sciences* (December, 1907). He says, in part:

In well-defined instances of pulmonary tuberculosis it is the rule to find tubercle bacilli in the feces. If a case comes under the observation of the clinician which is not at all clear, but presents a clinical picture resembling malaria, enteric fever, or acute miliary tuberculosis, the finding of tubercle bacilli in the feces will determine the diagnosis. In those suffering from chronic diarrhea with no other appreciable symptoms, pulmonary or otherwise, the tubercle bacillus is at fault in most cases. These cases have frequently come to autopsy, some showing intestinal ulcerations and others showing no ulceration.

Instances of ascites, the exact nature of which was unknown, were diagnosed positively as tuberculous by the finding of the tubercle bacillus in the feces. The cases were further proved by surgical procedures—i. e., abdominal operations. As a well marked intestinal tuberculous ulcer is appreciable from the appearance of the serous coat of the gut, in one case thus operated upon no ulcer was present. That tubercle bacilli are in the feces irrespective of a pulmonary or intestinal lesion is proved by the fact that I have found them in cases of general glandular involvement, meningitis, hip-joint disease, and Pott's disease of the spine.

"McFarland (*Pathogenic Bacteria*, p. 315): "It is very difficult to find tubercle bacilli in the feces because of the relatively small number of the bacilli and the large bulk of the feces."

Levy and Klemperer (*Clinical Bacteriology*, p. 265): "The demonstration of tubercle bacilli in the stools permits of a diagnosis of intestinal tuberculosis only in the absence of primary pulmonary tuberculosis. If this is present it may be concluded that the sputa have been swallowed, the bacilli of which appear in the feces unchanged. For this reason examination of the stools but rarely yields practical results."

Simon (*Clinical Diagnosis*, p. 285): "Tubercle bacilli when present in the feces are an indication of intestinal tuberculosis, providing they are observed upon repeated examinations, and there are clinical symptoms pointing to the bowel as the seat of the disease; otherwise they may be referable to swallowed sputa."

SahlI (*Diagnostic Methods*, p. 440-441): "In intestinal tuberculosis these bacilli are found in the feces, and are therefore of diagnostic importance. The stools may, however, contain these bacilli, even though there is no intestinal tuberculosis, if the patients swallow their sputum. * * * We do not know whether under certain conditions decomposition may destroy tubercle bacilli in the intestines; at any rate, we can not always demonstrate tubercle bacilli in the stools, even when there is undoubted intestinal tuberculosis. * * * As tubercle bacilli in the feces may be due to swallowed sputum, we can diagnose intestinal tuberculosis if tubercle bacilli are found in the feces only, when at the same time attacks of diarrhea occur with pus and blood in the stools."

Dr. Rosenberger gives much experimental and clinical evidence in support of the theory that the most frequent method of infection in tuberculosis is through the intestinal canal. He says:

In a number of autopsies in which the mesenteric and other glands were studied bacteriologically it was found that over 40 per cent showing no tuberculous lesions in any part of the body were tuberculously infective. It was also found that in all cases of active tuberculosis and in most cases of inactive tuberculosis the mesenteric glands were tuberculously infective.

In the cases reported his conclusions are as follows:

- (1) No acid-fast bacillus other than the tubercle bacillus was found in the feces.
- (2) The finding of tubercle bacilli in the feces means that active tuberculosis exists somewhere in the body.
- (3) In acute military tuberculosis the tubercle bacillus is always found in the feces.
- (4) In all cases of chronic diarrhea, and in cases of general glandular involvement, the feces should be examined for tubercle bacilli.
- (5) Finding tubercle bacilli in the feces does not mean intestinal ulceration in all cases.
- (6) In arrested or healed pulmonary tuberculosis no tubercle bacilli are found in the sputum or feces.
- (7) The feces should be studied for tubercle bacilli as a part of the routine examination, especially in suggestive cases, and when no expectoration can be obtained.

It seems probable to us: (1) That the tubercle bacillus is excreted, in part at least, through the intestinal canal. The possibility of bacteria passing through mucous membranes as in the case of other organisms, with or without producing noticeable lesions, has ample clinical and experimental support. Rosenberger and others have injected rabbits and guinea pigs subcutaneously with human tubercle bacilli, and the organisms were recovered from the feces on the fourth day. This phase of the subject deserves further study. (2) That in active tuberculosis of any part of the body, tubercle bacilli may at some time be demonstrated in the feces. In cows this proposition seems practically proved by the work of the Public Health and Marine-Hospital Service on milk and its relation to public health. Rosenberger's work goes far toward proving it for man. The ease with which we have been able to demonstrate the tubercle bacillus in the feces in our own cases of active tuberculosis leads us to support this view. In a case of tuberculosis of the left humerus, with moderate pulmonary involvement, tubercle bacilli were found in the feces on the first examination. A few were found in the sputum on the second examination. A smear from the pus from the tubercular sinus showed numerous tubercle bacilli. His urine contains a large amount of pus, and tubercle bacilli have been demonstrated in it. This patient has so few subjective symptoms referable to his lungs that he thought there was nothing the matter with them, and it seems to us that

swallowed sputum will not account for the number of tubercle bacilli in his feces. He has no intestinal symptoms. (3) That the presence of tubercle bacilli in the feces is a constant menace and may result in ulceration whenever a point of sufficiently low resistance is met. Our recent epidemic of typhoid fever illustrates this point. Several men who had been improving steadily up to the time they contracted typhoid, and who recovered from it, succumbed subsequently to intestinal tuberculosis because the damaged intestine furnished a favorable field for the tubercle bacilli to work upon. The truth of this statement is emphasized by the fact that tuberculous ulcers were present in the intestines of 72 per cent of our cases examined at autopsy.

AUTOPSIES.

Nineteen cases came to autopsy during the year. All these cases presented a very similar picture—far advanced pulmonary lesions with involvement of the mesenteric glands and lesions in one or more other organs.

Intestines.—These showed ulceration in 13 cases; no mention of ulceration in 1 case.

Mesenteric glands.—These were involved in 14 cases; not mentioned in 5 cases.

Right kidney.—Tubercles in 6 cases. In 2 cases the right kidney was rudimentary; one of which had two ureters.

Left kidney.—Tubercles in 9 cases.

Spleen.—Tubercles in 7 cases.

Liver.—Tubercles in 4 cases.

Heart.—Pericarditis with dense adhesions in 1 case.

Lungs.—Both lungs showed far advanced lesions in all cases. Many showing cavities.

Larynx.—Involved in 4 cases examined, in 3 cases not examined.

The condition of the lungs at autopsy in each case, when compared with the chart made at the last physical examination, demonstrates the accuracy with which the physical examination has been made. In some cases the pulmonary lesions had advanced somewhat during the interval between the last examination and the death of the patient.

Ophthalmo-tuberculin reaction.—This was employed in 6 cases, as an adjunct to diagnosis; 4 giving a mild reaction in eight hours, and 2 being negative. The negative cases were suspects in whom the diagnosis of tuberculosis had not been made. Of the 4 positive cases 2 had been diagnosed as tuberculosis from the physical signs alone; the third was an arrested case nearing a cure; in the fourth tubercle bacilli had been found. No bad effects resulted in any of the cases.

Water.—Three samples from the deep wells on the reservation were examined from a sanitary point of view, and all were found to give excellent potable water.

Milk.—The fat in the milk from the dairies supplying the hospital was estimated and found to be from 3.25 to 3.50 per cent. At the time of the typhoid epidemic a bacteriological examination of the milk from the suspected dairy was made. We were unable to isolate *B. typhosus*; but were justified in condemning the milk because all the cases which developed were users of the milk; there was a case of ambulatory typhoid found at the dairy. The epidemic stopped when measures were taken against the milk.

TONSILAR HYPERTROPHY; A MENACE TO THE SERVICE.

By Passed Asst. Surg. B. F. JENNESS, U. S. Navy.

Follicular tonsilitis is a disease of importance in the service, not only because of its prevalence under certain climatic conditions, and its rather stubborn epidemic influences, but from the fact that the disease, simple and transient as it may be in uncomplicated cases, carries with it the uncertainty and dangers of serious and debilitating sequelæ.

This disease, like many others seen in the service, has one or more of its predisposing causes traceable to conditions existing "prior to enlistment." Such conditions are being considered and remedied at our training stations, at medical surveys and board meetings throughout the service, but despite our high standard of examination, certain conditions are passed or overlooked which bear directly upon the future health record of the recruit possessing them. With our present system of segregation and increased hospital facilities a larger percentage of these predisposing conditions could be remedied, or eliminated by survey, than is now the case, and the recruit would have a cleaner health record and his chances of permanent disability during his career would be diminished.

The remote results of disease in the service concern not only the medical profession and the patient, as is the case in civil life, but both are responsible to the state, and the future health of the enlisted man is a matter of national military strength in time of war, and one of economy to the Government in time of peace. In foreseeing the result of defects and predisposing conditions in the recruit we are rendering a service beyond that of physician to patient, for we are reducing the pension lists of the future and prolonging the usefulness of trained men.

It is of more value to the navy to have a healthy man in the third year of his enlistment than in the first, because he is more experienced.

And when we remedy conditions in the recruit which three years later will cause disability, we render a professional service equal to that of enlisting a man of three years' experience and training. We must, then, in our examinations, look to the future of the seaman, and to the service he may render, as well as scrutinize his present physique, and we should not judge his future usefulness by his present fitness for duty.

Tonsillitis being a disease of youth and adolescence, when glandular activity is at its height, it is more prevalent among recruits and sailor men during their first enlistment than later in their careers.

With due respect to the rheumatic theory, we consider the disease due to an infection from the pharynx, and believe that under certain climatic conditions the vitality of the tonsil is so lowered as to cause this gland to succumb to such infection. This period of greatest glandular activity in the lives of our recruits corresponds with their age of admission to the service, or the first year or two of their enlistment. During this period the majority have undergone several acclimatizations and exposures to local conditions which are new to them, and which exert a debilitating influence upon them. If there exist at time of enlistment deformities or defects which predispose to disease, the stress of early service life, and changes of climate, food, and environment will tell on the weak points, and disability result.

Tonsillar hypertrophy is one of the weak points in the physical make-up of our recruits. This condition is given but little attention in the service, and yet it is undoubtedly a factor in raising the percentage of sick by causing admissions under the head of tonsillitis, laryngitis, pharyngitis, otitis, or, in extreme cases, bronchitis.

The condition not only predisposes to frequent attacks of tonsillitis of the follicular variety, but it is a part of a vicious circle of debility which may have existed before enlistment. If enlarged tonsils were present at the time of enlistment, the recruit was probably a tonsillitis subject from childhood, and whether the hypertrophy followed attacks of the disease or the enlargement was congenital and predisposition exists matters not. He is almost certain to continue having attacks, and the hypertrophy as certain to increase with each attack. Tonsillar hypertrophy is then of interest to service medical officers—both as predisposing cause of, and a sequel to, follicular tonsillitis.

The tonsil, like all glandular tissue at the age of our recruits, is easily affected by disease, and it takes on the cauliflower-like growth of hypertrophy as result of irritation and congestion. The crypts of the tonsil enlarge, and at each attack of inflammation the bacteria find a more nutrient and safer culture medium in the depths of the enlarged crypts. Such growths, or overgrowths, in the pharynx reduce the vitality of the organ and so predispose to pharyngitis, while more marked cases produce the mouth breathers and expose

the larynx and bronchi to irritation and infection. The close proximity of the eustachian tube to the tonsil endangers this canal to infection, with consequent middle-ear disease and permanent injury to that organ; or, if not this, to mechanical obstruction by disturbing the soft palate and tensor palati muscle, causing temporary deafness.

Considering follicular tonsilitis as the natural result of luxuriant tonsils, and the diseases of the auditory and respiratory organs mentioned as sequelæ of tonsilitis, we shall do well to anticipate these affections in the life of the recruit and to eliminate them and their causes and results by removing hypertrophied tonsils.

This treatment may not bring immunity upon any individual operated upon, but certain it is that the infective field will be reduced, and the patient will go into service better able to combat infection with his degluto-respiratory and auditory organs than before operation.

At present only extreme cases of tonsilar hypertrophy are rejected at the recruiting offices and training stations and these cases are, as stated in the book of instructions on recruiting, rejected when "hypertrophy of the tonsil is sufficient to interfere with respiration and phonation." If only such extreme cases are held up or rejected, the process of elimination is made upon subjective symptoms resulting from hypertrophy rather than upon the defect itself.

It is believed that all cases of tonsilar hypertrophy in recruits should be treated either by tonsilotomy or by freely opening the crypts, depending on the amount of enlargement.

Such tonsils can be treated either during the training station life of the recruit or out in active service, but the object of this article is to urge treatment of these cases as soon as men are enlisted, and furthermore, to advocate the rejection of recruits with marked tonsilar enlargement who refuse operation.

Were these principles carried out at the barracks and recruiting stations, there would be an appreciable decrease in the number of cases of follicular tonsilitis in the service, and an improvement in the general health of the enlisted man.

THE ICE BAG IN THE TREATMENT OF TYPHOID FEVER.

By SURG. G. TUCKER SMITH, U. S. Navy.

The various hydrotherapeutic measures commonly used to reduce temperature in treating typhoid fever are, in their order of efficiency, the Brand bath, the wet pack, and the cold sponge. All of these methods entail the employment of several competent nurses and the most careful attention to detail and supervision by the attending

physician to render them effective. If improperly used they are a menace to the patient's recovery. Many patients complain bitterly of the cold-bath treatment, and in some cases it is contraindicated, as is well known.

For this patent reason, if no other, it would seem that any measure which will reduce fever and at the same time permit the patient to remain undisturbed in bed presents at least one distinct advantage, and it is believed that this is obtained by the use of the ice bag. It is well known how effective the ice bag is in reducing inflammation of the appendix, and it occurred to the writer last summer, when treating a case of typhoid fever in a young girl, to employ the method in her case. Its beneficial effect in that instance led to its further trial at the naval hospital in Brooklyn, when it was used in the three cases admitted during the autumn of 1908.

In all these cases also its effect was markedly beneficial. No baths or sponging were required, no tympanitis occurred and there was no delirium or hemorrhage from the bowel. The fever was kept down and the patients all stated that they experienced no inconvenience from the ice bag and that they were conscious of its good influence.

The Widal reaction was positive in all three cases. The clinical charts were interesting, in that the decline of the temperature curve was progressive, following the application of the ice bag, reaching normal: In the first case, on the sixth day, about which it remained with decreasing diurnal variations until complete recovery; in the second case, on the third day, followed by a brief subnormal dip, and about which it remained with slight diurnal variation until complete recovery; and, in the third case, on the tenth day (practically), about which it remained with decreasing diurnal variations until complete recovery. The fastigium was, respectively, $103\frac{2}{3}^{\circ}$, $100\frac{2}{3}^{\circ}$, and $103\frac{2}{3}^{\circ}$.

The technique is simple. A clean towel is opened and first placed over the abdomen next to the skin; then a large abdominal ice bag is applied to cover the whole area below the umbilicus and kept there constantly until the temperature falls to normal. The bag must be refilled with ice every two hours, night and day. The belly should be inspected from time to time to see that the skin does not become frozen, but this never occurred when the towel was used beneath the bag.

The general management of these cases was that ordinarily followed, viz, liquid diet and careful nursing. Doubtless the efficacy of the application of cold to the belly directly over the main seat of infection (the lower ileum) is due to its inhibitory action on the growth and multiplication of the typhoid bacilli and, consequently, upon the liberation of their toxins.

It is recognized that a series of but four seemingly mild cases is far from sufficient to establish the value of any observation or the merits of any therapeutic measure; yet, the results in these cases were so striking that the subject of this paper is presented in the conviction that the idea suggested is deserving of more extended trial, especially in the navy, where it should be particularly useful.

TREATMENT OF TYPHOID FEVER BY COLON IRRIGATIONS.

By the late Asst. Surg. C. G. ALDERMAN, U. S. Navy.

This treatment has been tried before unsuccessfully and was relegated to the past because, it is believed, of the absence of any clearly defined procedure. But recent experience and careful observation has led to the conviction that it is a method of considerable value and one that has a legitimate place both in civil and military or naval practice, though according to circumstances there may be differences in the manner in which it is carried out.

DESCRIPTION OF THE METHOD AND ITS RESULTS.

If the patient is seen before the eighth day of actual onset, he is purged freely, generally with calomel and sodium bicarbonate (3 and 5 grains, respectively), followed in three hours by one-half ounce magnesium sulphate. At any time later than the eighth day of onset, the attending physician must, in his judgment, determine whether or not the purge can be administered with safety. When there is an inclination to a bowel movement, a low enema (plain water) may be given to assist; following this immediately, a high enema (plain water) at 85° F. is given to flush the colon. The size of the latter injection depends upon the patient, but generally ranges between 1 and 2 quarts. As soon as a little uneasiness is complained of by the retention, withdraw the tube and allow the bowel to expel its contents. Take the temperature twenty minutes after the bowels move. The reading will not show much reduction, if any. The next two enemata are to be given at a temperature of 80° F.; the next two at 75° F.; and the next at 70° F., at which temperature the enemata, as necessary, will be continued. On occasions, without any assignable reason, patients retain the second or third enema. The enemata are given at three-hour intervals as long as the temperature is above 100.6° F.

The diet consists wholly of milk (5 to 6 ounces every three hours during the day) diluted with lime water according as it agrees with the patient; and all the water he wants to drink.

One might hesitate to give the enemata if either diarrhea or constipation are present when the patient is first seen. Neither is a contraindication and either will disappear upon beginning the treatment.

As to hemorrhage, the writer can say nothing from personal experience, having observed but one case. The opinion is entertained, however, that such a complication is unlikely in this treatment, unless due to some indiscretion of diet, the assertion being based upon the pathology of the condition. Briefly, there is an ulcer with characteristic inflammatory changes, including weakened and engorged blood vessels, and this tension, with the consequent imminence of hemorrhage, should in all reason be relieved by the local application of cold. This contradistinction to the inward determination of blood by the chilling of the body surface, as in administering the sponge bath or the plunge. If hemorrhage does occur, it should probably be treated in the customary manner, although as regards this complication each case is a law unto itself and circumstances may indicate or admit other procedure. As regards perforation, this is indisputably a surgical condition and when it occurs demands operative treatment at the earliest possible moment.

It is not claimed for this treatment that it reduces the temperature after each enema, as do sponge and plunge baths, but one thing is strikingly noticeable if several charts are examined: The patient may come in at the beginning of the second week with a temperature of 104° to 105° F. probably having reached the fastigium or rapidly approaching it. Normally, if left alone, it would hover between this point and a degree less. With sponge or plunge the temperature rapidly falls, but at the end of three hours it is back to the same point, or possibly, and as a matter of fact quite often, a little higher. Compare the record of the cases thus treated with the charts of the cases treated by enemata. It will be found that the fastigium is lowered to possibly 103° F., and the morning drop correspondingly.

Then turn your attention to the patient; if any symptoms of septic absorption are present they are scarcely noticeable. No delirium is seen, nor is there the anxious look, the dull heavy eye, the muscular twitchings, etc. He complains of no headache or other pain, has a bright appearance, and there is no tympany, or, if any, it is but slight.

The patient actually loses the so-called typhoid facies, which every physician is accustomed to meet.

The convalescent stage progresses rapidly, the patient generally leaving hospital four days after he is up and out of bed, which is generally admissible before the twenty-eighth day counting from the time he went to bed.

The return to diet lies within the discretion of the physician with the following caution ever guiding: "Do not feed too much or too fast."

Constipation following after temperature is below 100.6° F. requires an enema every thirty-six hours until the patient is up and around.

The rationale of this treatment is based upon the widely accepted theory of a local infection, of the solitary glands and Peyers Patches, with systemic manifestations. The theory of general infection has not and, it is believed, can not be substantiated, in spite of the presence of bacilli in the blood and urine, as well as the feces. On the other hand how overwhelming is the evidence that typhoid fever is a symptom-complex of specific intestinal irritation—plus septic absorption. The autointoxication, with the poisons of bacterial activity, and from the dead tissue and pus-like discharge from the ulcers in the small bowel, before being forced through the ilio-cæcal valve into the large bowel, of course can not be prevented; but after reaching that section of the alimentary canal it is but the exercise of intelligent therapeutics to clear everything away as indicated at reasonable intervals to prevent further absorption. But the colon irrigations accomplish more than this in the interest of immediate and remote benefit, for the cold water exercises a direct counter influence upon the congested region, effecting a contraction of the blood vessels and tending to start the stagnant blood, thereby assisting nature to overcome the inflammation. Moreover, the fever seems to be controlled without marked reaction or undue stimulation, which is often the result of the Brand treatment, and it is possible to conserve the patient's energies for his fight with the disease instead of taxing them by more or less exertion incident to the plunge bath, no matter how carefully it is given. At the time of each irrigation an ice cap should be used to counteract the tendency to vicarious congestion of the brain.

THE METHOD FROM THE NAVAL POINT OF VIEW.

It should be a valuable asset in the management of typhoid in the naval service, and differs only in the possibility of more prompt employment and consequently in more favorable results. As a rule, in the navy immediately a man feels at all sick he reports at sick call, and thus a case of the disease may be discovered and placed under treatment early. By this method a threatened epidemic of typhoid fever may be controlled from its very inception.

Some astonishing results were noted in the epidemic at the United States naval hospital, Las Animas, Colo., as a result of detecting the disease at its beginning and putting the patients on treatment

immediately. Some of the cases giving the Widal reaction ran a temperature for only a week, then dropped to normal and stayed there.

Treatment of the epidemic.—When the epidemic of typhoid broke out in August, 1908, the question as to the character of treatment to be adopted was an important one because of the complication with tuberculosis. After careful consideration the plan of treatment above outlined was agreed upon and carried out.

There are only two cases to report in which there was a simple infection of typhoid fever; all the others were complicated with tuberculosis, and one of these, which died, was also complicated with nephritis. In addition to this case, one case of perforation died, making two deaths out of 28 and giving a mortality rate of 6 per cent, which is particularly low in cases of this kind.

There was nothing unusual in the temperature charts, but the following are the interesting cases in brief:

Case No. 1.—T. S., Chinaman, laundryman. No tuberculosis. Temperature ran the usual course; in three weeks was up and around.

Case No. 2.—E. D., civilian laborer. No tuberculosis. Fourth day after enemata were started the temperature ran normal. Responded to Widal test.

Case No. 3.—T. H., Japanese, ward-room cook. Very severe infection of tuberculosis. Temperature had never been normal since admission to hospital until put on this treatment. His case has improved since the typhoid infection.

Case No. 4.—I. D. C., ordinary seaman. Infected with tuberculosis. The only case of hemorrhage in epidemic; under his pillow was found a box and sack of candy, showing the probable cause for the hemorrhage.

Case No. 5.—H. J. W., warrant machinist. Infected with tuberculosis. After the fifth day of treatment, temperature never went above 99.2° F. Responded to Widal test.

Case No. 6.—F. G. P., paymaster. Infected with tuberculosis. After the seventh day of treatment, temperature remained normal. Responded to Widal test.

Case No. 7.—O. D. F., yeoman. The first case that Doctor Wright reported; went through the typhoid without any seemingly ill results, and had no increase in pulmonary involvement.

Case No. 8.—E. C. C., ordinary seaman. Infected with tuberculosis. Was admitted to typhoid ward with temperature of 104° F., temperature being so high that he was given sponge baths for three days with no results as to reduction in temperature. Enemata treatment was instituted and in thirty-six hours his temperature was running between 102° and 102.8° F.; from then on ran the usual

course. This case shows the value of this treatment, in comparison with the sponge bath, both having been used.

Summary.—Patients averaged a loss of 8 to 10 pounds, due in all probability to the light diet, and did not seem to be very much weakened by their sickness.

The results obtained in this epidemic should warrant a further trial of the treatment in the navy. An epidemic breaking out on shipboard could be handled in this manner when the other treatments were useless or impracticable. On just such trips as our fleet is now taking the enemata treatment would prove its value, because of the distance between ports. But if good results are obtained, why should it not be used in general hospital practice?

SUGGESTED DEVICES.

DESCRIPTION OF A PIT INCINERATOR FURNACE.

By Surg. R. C. HOLCOMB, U. S. Navy.

The following description of a pit incinerator furnace is of the type used at the naval hospital camp, Norfolk, Va. Incinerators of this type have been used since this camp was first organized in the fall of 1907 and have been so satisfactory that a description is here given with the hope that it may help to solve, elsewhere, one of the sanitary problems of camps or hospitals. After an experience with various forms of incinerators, I am convinced that a pit is the most sanitary method of disposing of wet swill, so far as the vicinity of the incinerator is concerned. If the swill has to be shoveled, grease and swill is always sprinkled, slopped, or spilled about the sides and vicinity of the incinerator, whereas if there is a pit the barrels are simply dumped into the pit's mouth, the vicinity swept at once and kept clean. The crematory here described is used to burn wet swill, camp and ward rubbish, feces and offal of all quarantine camps, sputum cups, soiled dressings, tin cans, etc. The swill from the mess halls and kitchens is collected in galvanized-iron cans. These cans do not set on the ground, but on a two-plank platform about 20 inches high. The space about the platform is cemented to prevent spilled swill from freezing to the ground and for other general sanitary reasons. The platform makes them easy to handle in placing in the cart without spilling, and greatly saves the life of the cans, preventing the rusting from setting directly on the ground and the results of careless handling of the empty cans, as dropping on the ground. It also offers ample facilities for cleaning about the cans and leaves little excuse for the unsightly and nauseous surroundings of the usual swill cans.

The incinerator is best built in the side of a slope. In the case illustrated here it is built on the slope of a beach just above high water. The carts can drive down and dump the swill or rubbish into the pit of the incinerator.

The wall of the fire box is built the width of four bricks and carried above the level of the floor eight courses before turning the first arch. The wall should be so laid that the majority of the bricks will

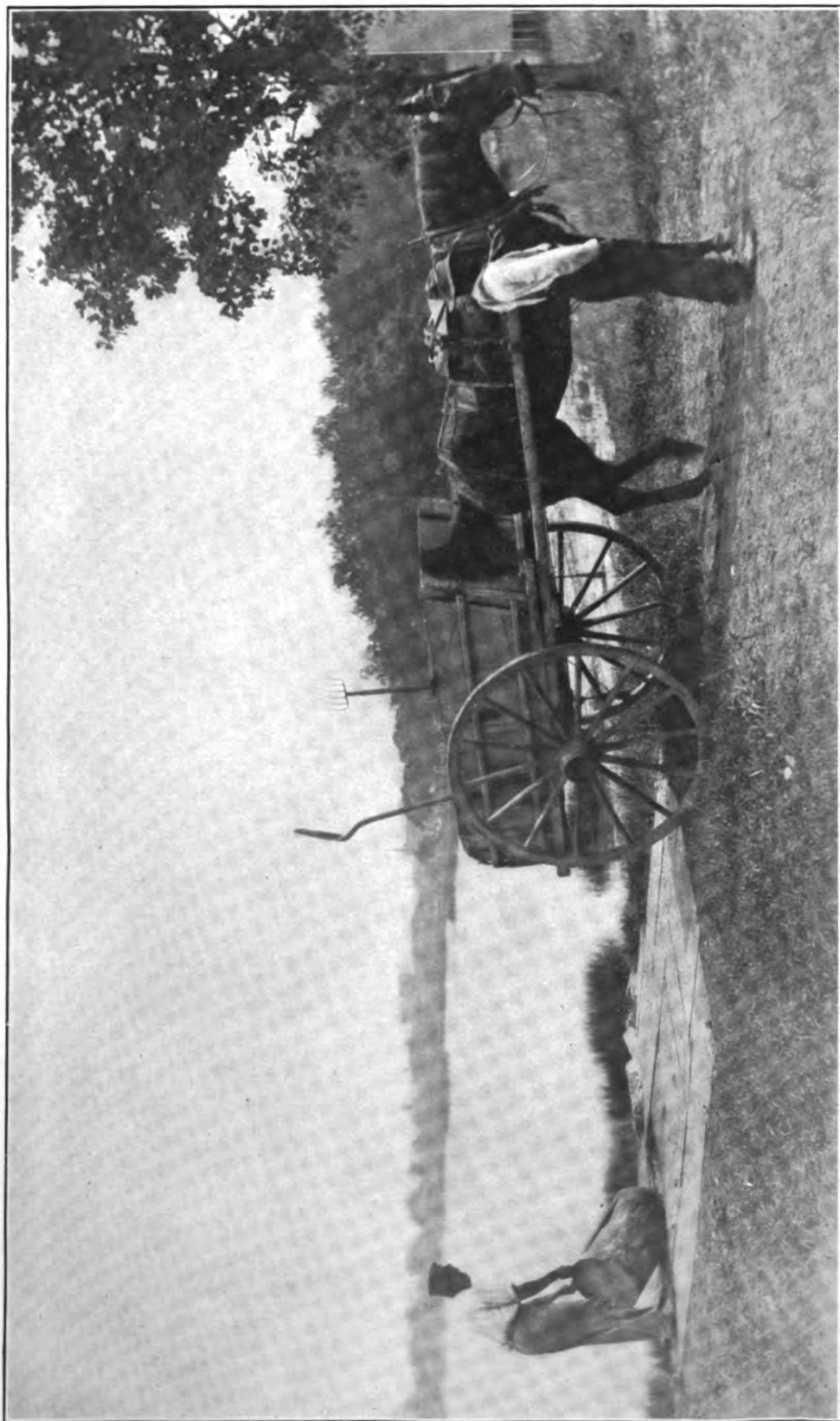
be tie bricks, presenting the ends rather than the sides of the bricks. The floor of the fire box and also this arch should both have a backward tilt. This will allow the fluid swill to flow off the arch to the back of the fire pit where the fire is hottest, and where it is more quickly consumed. The first arch is carried back to within 20 inches of the back wall, where a space is now left for the reverbratory flue through which the heat and fire of the box below is carried up over the first arch, which forms the incineration shelf, held down to the shelf by the second arch, which forms the roof of the incinerator.

On the roof of the first arch or incinerator shelf is now laid an iron floor plate with due allowance for expansion and contraction, and guttered on either side to carry the wet swill back to the hottest part of the fire box. In building the incineration box drop back one brick.

The second arch should be low, not over 20 inches above the shelf, to throw the heat right down onto the material to be consumed. In the front of the incinerator just about the first arch is placed a door which opens into the incinerating chamber. The sill of this floor should be about 2 inches above the level of the shelf to prevent any wet swill from flowing out. As the material on the incinerating shelf bakes and takes fire, it can be stoked back off the shelf into the back of the fire box. The first arch may be built with perforated radial brick, such as is used to build chimneys. By this means the evaporating surface due to the porosity of the brick is increased from 12 to 16 times, according to the number of perforations. The fire box and the inside front wall of the pit are best lined with an extra layer of brick, and this lining can be taken out and renewed from time to time as the bricks burn away and thus greatly lengthen the life of the incinerator. The incinerator of the type above described burns all the waste of the hospital reservation, including hospital, officers' houses, marine barracks, etc. Boxes, crates, drift-wood, and dry burnable material is burned in the fire box, and the wet material on the shelf. There is no trouble from odors. It is our experience that odors come from the low smoldering fires; if odors develop, the fire is increased and the odors are thus dissipated.

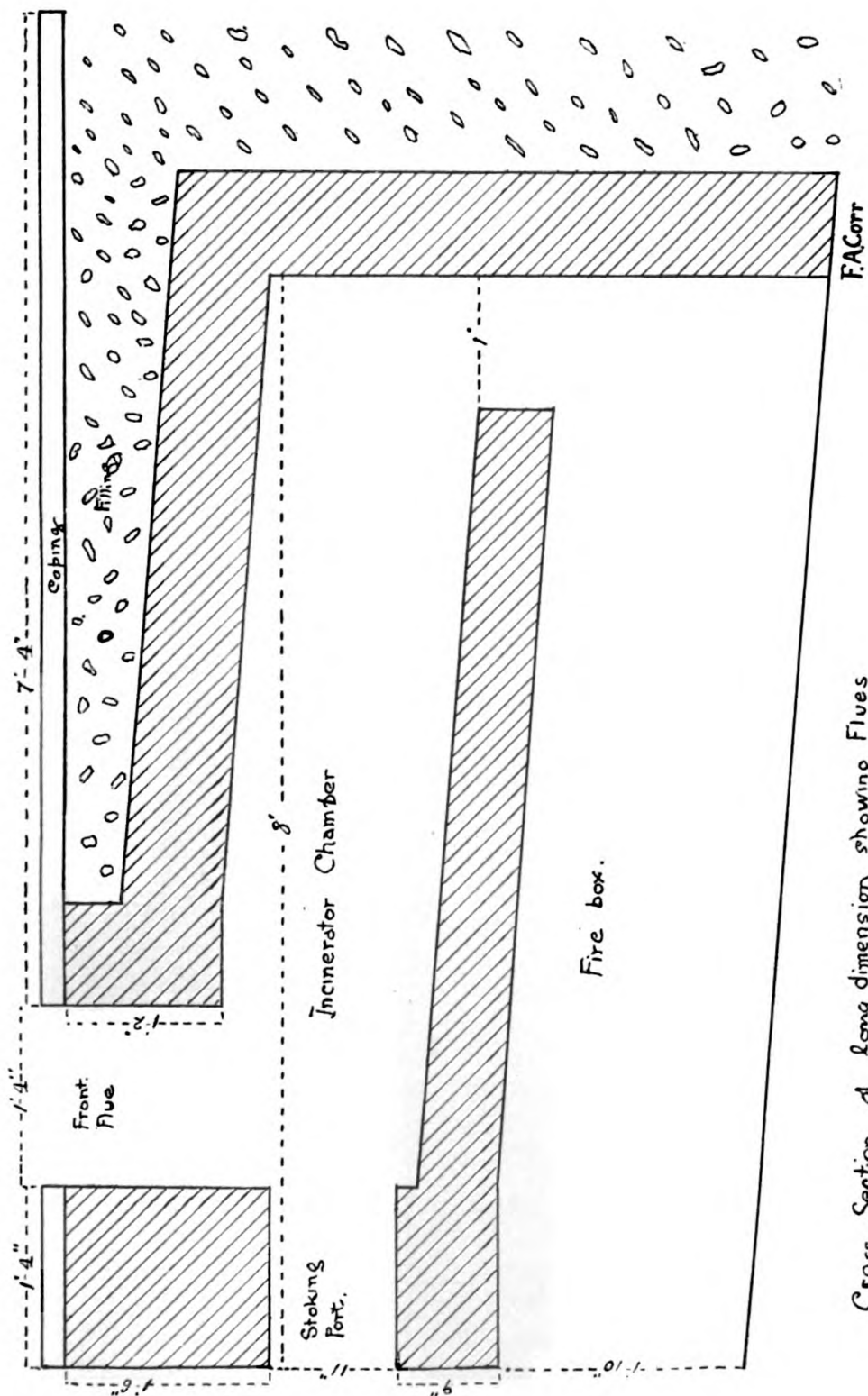


FRONT VIEW OF GARBAGE CREMATORY. (HOLCOMB.)



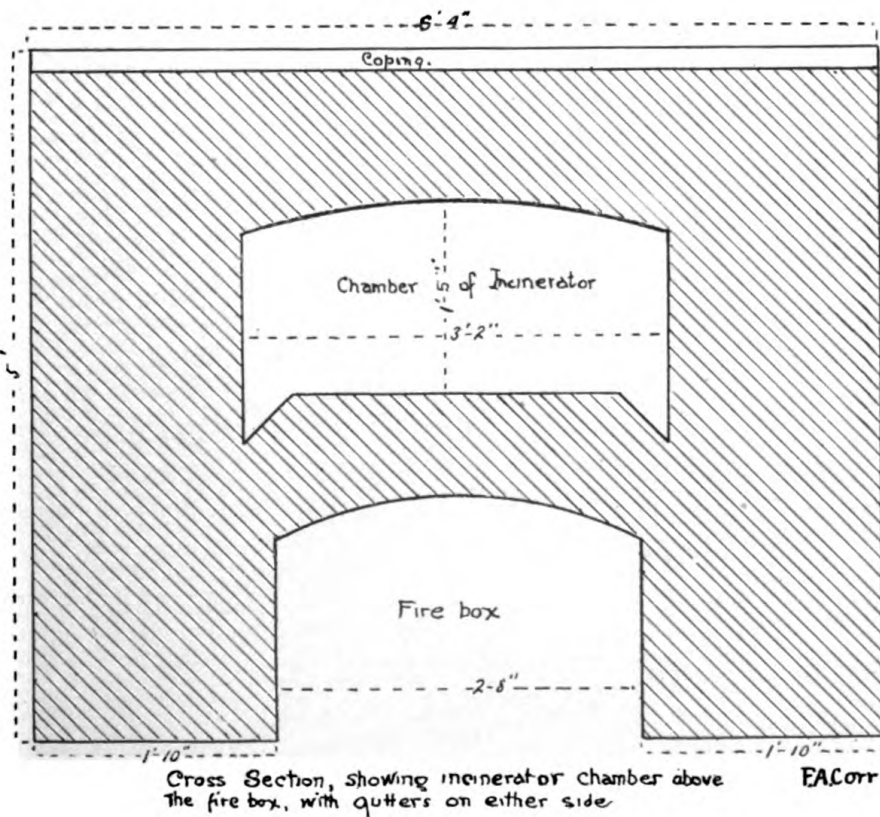
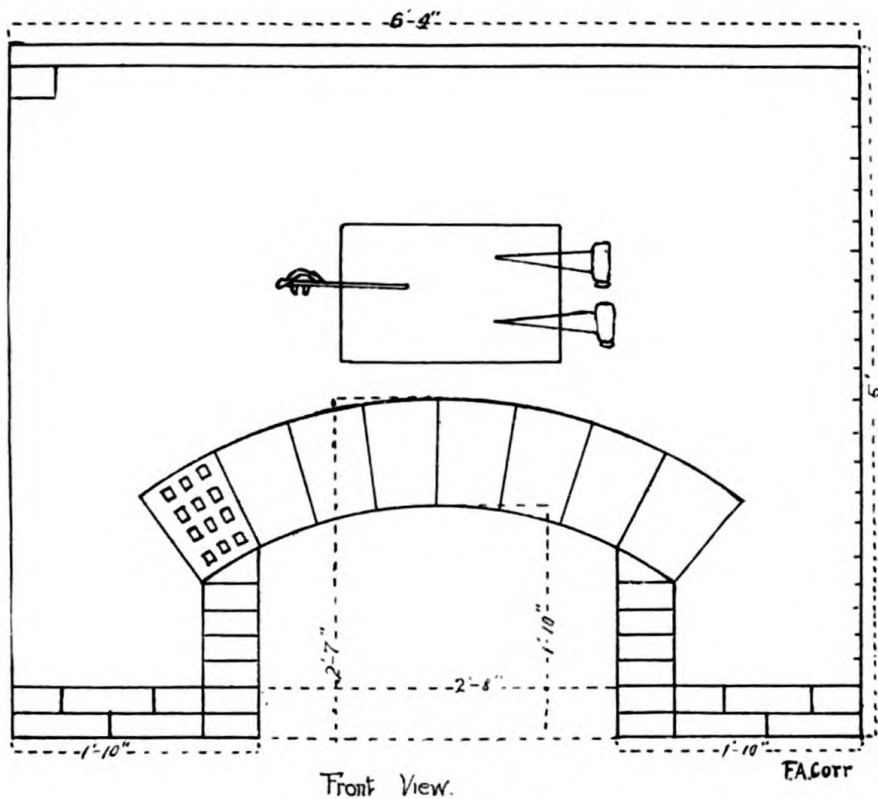
VIEW OF CREMATORY FROM THE TOP.

The refuse is easily thrown into the pit and the vicinity kept clean without dripping and spilling, which invariably occurs when swill is shoveled through a door in the wall of the crematory.



Cross Section of long dimension showing Flues

GARBAGE CREMATORY.



GARBAGE CREMATORY.

CLINICAL NOTES.

REPORT OF A CASE OF MALIGNANT ENDOCARDITIS FOLLOWING CHANCROID.

(From United States naval hospital, Mare Island, Cal.)

By Asst. Surg. I. FRANKLIN COHN, U. S. Navy.

The following case is considered to be of interest, as it illustrates a somewhat unusual method of the development of malignant endocarditis, the micro-organisms gaining access to the circulation through the ulceration of a chancroid.

O. W. W., fireman second class, U. S. Navy, was admitted to the United States naval hospital, Mare Island, Cal., on December 19, 1908, as with "chancroid." There was no coexisting gonorrhea.

Previous history.—Age, 29 years; single. Has had about ten months' naval service and has never been on the sick list since enlisting. Was formerly employed as a railroad brakeman. Used alcoholic drinks excessively some years ago; tobacco, moderately. Stated that he had an attack of "typhoid-pneumonia" three years ago, and that he has always enjoyed excellent health since that time. He denied any previous venereal history or ever having had rheumatism.

History of present illness.—On admission he presented an annular ulcerating chancroid surrounding the meatus. The inguinal glands were not involved. Healing was fairly rapid under treatment by applications of crystals of copper sulphate.

On December 24 he suddenly developed severe cardiac symptoms; temperature, 101.2; pulse, 136; respirations, 52. The heart was found to be enlarged downward and toward the right and left sides. Auscultation revealed a diastolic murmur at the second right costal cartilage, transmitted toward the apex. The pulse was distinctly of the Corrigan type. He was discharged for change of diagnosis to *cordus valvularum morbus* (aortic regurgitation).

The septic condition gradually became worse, the temperature ranging from 100 to 103; pulse, 120 to 140; respirations, 40 to 60. A large area of impaired resonance, approaching dullness, was noticed over the lower lobe of the left lung, anteriorly and laterally.

The usual measures used in the treatment of acute endocarditis failed to give any relief. The white blood count ranged from 20,000 to 40,000. A purulent pericarditis was suspected and on January 5, 1909, a paracentesis of the pericardium was performed under local anesthesia (ethyl chloride), but no fluid was obtained. His condition rapidly grew worse, all symptoms increasing in severity and the dyspnea intense (respirations, 60). The leucocyte count reached 89,000. The septic condition was then believed to be due only to a pyogenic infection of the aortic valves. Death occurred on the evening of January 7.

Autopsy revealed a large mass of fleshy, vegetative excrescences on the aortic valves, about the size of the end of the thumb. When these were removed, for the purpose of making sections, a considerable amount of thick, yellow pus exuded from beneath the leaflets. Both pleural cavities were almost entirely obliterated by dense adhesions, undoubtedly the result of a pleuritis following his previous attack of "typhoid-pneumonia." The liver and spleen were both enlarged and congested, the latter organ showing evidences of amyloid degeneration.

Cultures were made from the pus obtained from the aortic lesion and from the chancroid, and the same organism (*staphylococcus pyogenes aureus*) was isolated in pure culture from both localities. Stained sections of the diseased valves showed numerous purulent foci.

The chancroid having been the only perceptible abrasion on the body surface, the isolation of the same organism in pure culture from both places, and the sudden onset of the septic condition following the chancroidal infection, all seem to indicate that the malignant endocarditis was the sequel of the venereal infection.

A CASE OF MULTIPLE INFECTED WOUNDS FROM BEAR BITE.

(From United States naval hospital, Sitka, Alaska.)

By Passed Asst. Surg. C. C. GRIEVE, U. S. Navy.

On August 7, 1908, W. H. R., aged 38 years, captain of a fishing sloop went ashore at Rodman Bay, Alaska, after deer. That evening while coming down the mountain side with a deer and his rifle slung over his back he stumbled upon a female brown bear with her two young cubs. Before he could unsling his rifle or throw off the deer she was upon him. In the struggle that ensued the patient was bitten 64 times, aside from the numerous and deep scratches over his body.

For three days he lay where he had fallen, but on the fourth he commenced his trip down the mountain side on hands and knees.



BEAR BITES—VIEW SHOWING GENERAL EXTENT OF INJURIES.



BEAR BITES—RIGHT SIDE.



BEAR BITES—LEFT SIDE AND BACK OF HEAD.



BEAR BITES—VIEW OF BACK.

reaching the beach on the evening of the seventh day. Patient had had neither food nor drink, except a few berries and what moisture he could get from leaves, during the period mentioned. The mosquitoes in Alaska during the month of August are frightful, and to escape these pests the wounded and almost naked man burrowed into the leaves and moss of the woods.

When the captain did not return to the sloop on the evening of the 7th, a party set out from the ship in search of him; but, although the search was kept up faithfully for the seven days of his absence, he was not discovered until he reached the beach on the evening of August 14.

The wounded man was immediately taken on board his boat and brought to Sitka, where he was placed in the naval hospital. When he reached the hospital he was delirious, emaciated, and every wound was streaming with pus. The odor was nauseating.

The patient was immediately given a hot antiseptic bath, the moss, leaves, and dirt picked out of his wounds, and the infected surfaces were cauterized with pure carbolic acid, followed by alcohol. Thereafter the wounds were washed out daily with running hot bichloride solution, 1 to 1,000, and moist gauze was applied to body. In thirty-seven days the patient left the hospital in fine physical condition, but terribly scarred.

The following are a few of his more severe wounds:

1. Nose broken.
2. Bone exposed on right temporal region.
3. Left ear hanging by shreds at top and bottom.
4. Two severe scalp wounds over occipital bone.
5. Right shoulder and forearm badly bitten.
6. Teeth meeting in right wrist.
7. Large wound left thigh.
8. Two large ragged wounds right thigh.
9. Five severe bites right leg.

The right leg was very much swollen and black, and here the infection was deep seated, necessitating free incisions for drainage.

The accompanying photographs were taken about two weeks after the man entered the hospital, and give some idea of the extent of his injuries.

This case is interesting in that it shows the remarkable nerve of the man, his powers of endurance, and the resistance of his system to infection. It also serves to disprove the time-honored fallacy originating in the claims of old hunters that bears never bite man.

A CASE PRESENTING SUCCESSIVE LIVER ABSCESES.

By Surg. H. C. CURL and Passed Asst. Surg. H. W. SMITH, U. S. Navy.

L. H. B., private marine; white; age, 27; family history unimportant; personal history unimportant until, during service in the Philippines, he became infected with amœbæ. This was early in 1904.

In October, 1904, a "perinephritic abscess" was opened and drained; the incision closed in about two months and patient returned to duty.

In July, 1905, he was admitted to hospital with diagnosis of "nephritis chronica." This diagnosis was probably based on the history of the perinephritic trouble in 1904. As symptoms seemed to point to the liver rather than to the kidney, an abdominal exploratory was done and a mass found in the liver, but for some reason it was not opened. The wound healed promptly.

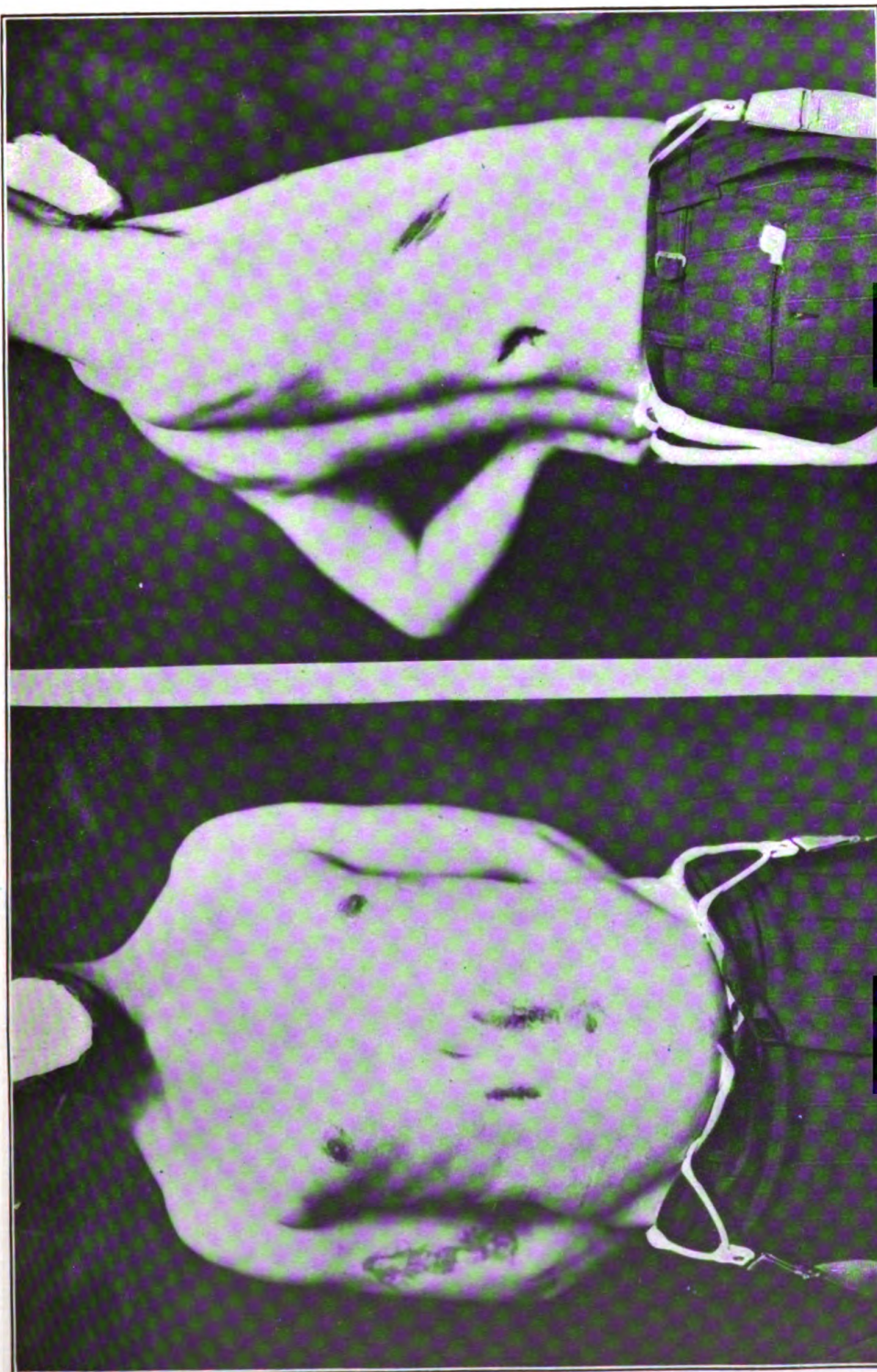
First abscess.—In October, 1905, a liver abscess of large size was opened and drained; access was through the thorax by resection of a part of the ninth rib (abscess was in right lobe and high up). Patient was discharged in good condition three months later.

Second abscess.—In July, 1907, a large abscess in left lobe was evacuated and treated in the usual manner. Recovery was again rapid.

Third abscess.—In October, 1908, patient was admitted to the United States Naval Medical School Hospital, Washington, D. C., for operation for a large ventral hernia which had followed an earlier operation. While waiting for the general condition to improve before closing the hernia, another abscess of the liver developed.

This third one was in the left lobe and was accompanied by more than the usual superficial tenderness. This feature was explained at operation, when it was found that the left lobe of the liver was simply a shell, surrounding a large pocket of "pus," and that it was firmly adherent to the anterior abdominal wall. The operation proved to be very simple, and drainage was established. On the second day following motile amœbæ were found in the material from the abscess and these continued to be present for several days. The closure of the cavity was very rapid, and one month from the date of operation the wound was entirely closed.

On December 22, 1908, when the abdomen was opened while operating for closure of the ventral hernia, an opportunity was given for a thorough examination of the liver, and it was then found to be in an astonishingly good condition. The left lobe, which on November 4 was nothing but a thin shell surrounding the abscess, was found to be thinner than normal, but smooth and even in outline and but slightly adherent to the abdominal wall. Recovery from this oper-



Side view.

Front view.

SHOWING SCARS OF OPERATIONS FOR LIVER ABSCESS.
(Scars shaded with pencil to show outlines more clearly.)

ation was uneventful and the patient is now in better general health than he has been for a long time; he has, in fact, grown fat.

This case has seemed worth recording because of the fact that recurrence of these abscesses is very rare, and because it brings up the interesting question as to whether or not infection remained in the liver or was the abscess in each case the result of a fresh infection from the intestine.

CEREBRO-SPINAL FEVER.

(A synopsis of and remarks on 11 cases occurring at the United States naval training station, San Francisco, Cal.)

By Surg. JAMES G. FIELD, U. S. Navy.

In presenting a résumé of the following cases of *Febris cerebrospinalis* and the thoughts suggested thereby, nothing is claimed as proven, for the disease is as yet such a "terra incognita" in relation to the origin of the *materies morbi* and their channels of invasion that the whole matter may be called a "quod est demonstrandum," save the specific causative agent, which is accepted as proved.

The belief that infection by the specific germ is favored by overcrowding or other unsanitary conditions is generally accepted; yet the baffling point is, why will like conditions originate the disease at one time and not at another? This would seem to indicate that there is a distinct period of incubation during which the causative agent must grow in virulency external to its host or victim before manifesting its effects in others. The thought has repeatedly impressed itself on me that the diplococcus has a greater viability in a saprophytic state or environment than is now accepted.

This thought seems supported by the fact that the cases noted below seem to crop out in pairs or triplets or quadruplicates, closely connected as to date, followed months or weeks later by one or more new cases, notwithstanding the fact that sanitary conditions remained constant and the utmost efforts were used to prevent, as far as possible, the features which were thought to be the "fons et origo" of the diplococcus *intracellularis meningitidis*.

The contention that this synchronism of cases is explainable on the hypothesis of direct or immediate infection from the first case of the group is hardly tenable, on account of the fact that in no instance did the boy swinging on either side of the one taken (the average distance between hammock hooks is 28 inches and the sides of adjoining hammocks almost touch when occupied) show the disease, whereas the next case would develop hundreds of feet away in a very remote part of an enormous barracks.

Whilst on this point let me say I am almost persuaded that the infectiousness or contagiousness of a patient per se is so slight as to be almost a negligible quantity. I have never (but others may have) known the disease to appear in those who have treated, nursed, performed autopsies, or who were otherwise associated with it; nor have I known one patient to contract it from another, though last winter our accommodations were such that many of these cases had to be cared for in wards with many other patients ill with different diseases.

The above statement, however, must not be construed as meaning that segregation of these cases is not desirable. Until something more definite is proven, wisdom suggests that they be isolated when practicable, though when ventilation is satisfactory the danger seems slight.

Relative to the patient to be, it occurs to me that a personal equation other than age plays an important part as to vulnerability, and that is impairment or actual disease of the nasal or pharyngeal tracts. The early evidence of great irritation in the nose and congestion of the palpebral and ocular conjunctivæ, with marked increased secretions from both, taken in conjunction with the early frontal headaches and demonstration of the diplococcus in the nasal secretion, as was done here in one or two cases, leads one to think that the extension is from the nose to the meninges of the brain through the ethmoidal foramina by continuity of tissue, and to concur in the belief held by many clinicians that the air passages are the channels of entrance.

The further deduction is logical that the specific organism is thrown off in the secretions of these tracts and after impregnating the air or dust of the apartment undergoes a putrefactive change, classes itself with the pus-generating bacteria, and is capable of producing the disease in a suitably adapted person.

The disease recurs at this station every year, a greater number of cases having occurred during 1908 than during any previous twelve months in its history, but whether the location has become a permanently infected one or whether the infection is being brought at intervals from San Francisco, where the disease exists all the time, can not be proven.

Now let us glance at a brief report of 11 cases.

Case No. 1.—W. A. H. (A. S.), age 17 years 6 months. Taken ill January 8, 1908. Headache frontal and occipital, chill, temperature 102° , pulse 110, respiration 30, vomiting, Kernig's sign present. Put to bed; deafness became very pronounced, retraction of head very great, delirium active, petechial spots; temperature, pulse, and respiration increased. Constant tossing and rolling in bed, constant pulling at genitalia—in fact, a typical picture of the disease. This case was very severe, but under the use of ice bags, baths, morphine, hyoscine hydrobromate, cerebral sedatives, etc., made a perfect recovery and was discharged to duty January 20, after an illness of twelve days.

Case No. 2.—R. H. B. (A. S.), age 21 years 3 months. Taken ill June 23, and was an exact counterpart of the above-noted case, which occurred five months previously.

Lumbar puncture was done four times but no spinal fluid obtained, probably on account of its inspissated condition. This case was treated symptomatically and was sent to duty thirty-four days later perfectly recovered. His convalescence was slow on account of pains of a rheumatoid character in the knees and soles of feet.

Case No. 3.—W. H. R. (A. S.), age 24 years 4 months. Patient reported at sick call at 9.10 a. m. August 29, complaining of headache anteriorly and posteriorly; was put to bed and remedies used to relieve headache. At 2 p. m. said he was feeling better; at 4 p. m. he became violently delirious and never regained consciousness, gradually sinking into a comatose state with increasing muscular spasms and rigidity, which lasted till death, September 2. Additional symptoms noted were strabismus, Kernig's sign, albumin and sugar in urine, rapid pulse, and a temperature which remained normal most of the time, but which jumped to 105.5° just before death. There was constant pulling at genitalia until they were bruised and swollen. There were, also, projectile vomiting, of a dark feculent looking and smelling fluid, petechial spots, etc.

Autopsy showed pus in the anterior and posterior cornua and under the meninges, especially at the base of the brain.

About this time Dr. Phillip King Brown, of San Francisco, heard that there had been a case of spinal meningitis here and telephoned that he was the representative on this coast of Dr. Simon Flexner and would be glad to supply us with the Flexner-Jobling serum, which offer was gladly accepted.

Soon after *case No. 4* occurred in H. C. (A. S.), age 17 years, 5 months. He was picked up under his hammock at 6.30 a. m. September 4 in a semiconscious or stupefied condition, complaining of frontal and occipital headache, muscular soreness and pains in back; temperature 104° , pulse 110, respiration 30, Kernig's sign present, tendon reflex absent, dullness of hearing, nausea and chill; no retraction of head; leucocytosis 17,500; albumin in urine. Put to bed with ice bags to head and back of neck, hot water bags to feet, and morphine for pain. Slight spasms at times; coma deepened and delirium developed, which continued for ten days.

On September 9 lumbar puncture was performed, but spinal fluid was so "ropy" that it would not flow and was drawn out on the end of the wire in the needle. Diplococcus was present. Thirty cubic centimeters of Flexner's serum was injected, and was followed the next day by a rise in temperature of from 100° to 103° . On the following day an attempt was made to give another 30 c. c. injection of serum. Not having had any difficulty the previous day, chloroform was not administered or considered necessary; the puncture was easily done; but just as the serum began its flow into the canal, the patient, though being firmly held, gave a sudden twitch in his semidelirious condition, and the needle broke off, leaving about 2 or $2\frac{1}{2}$ inches in the back. Chloroform was immediately administered, and a deep incision made over the site of puncture with a view to locating and extracting the fragment of needle, but in vain. After recovery, the patient was put on the operating table and a most thorough search down to the point of entry of the needle into the spinal canal was made without finding the object sought for. No discomfort or consciousness of its presence was occasioned by the foreign body.

This case made a perfect recovery save total deafness in both ears, due probably to the destruction of the auditory nerve, for which he was surveyed and discharged from the service. During the course of the disease, ice bags and baths, morphine, bromides, hyosine hydrobromate, chloral, etc., ad infinitum were used.

Four days after the above case was taken ill *case No. 5* occurred, that of C. C. (A. S.), age 18 years 5 months 22 days. The patient came to sick call at 9.10 a. m., September 8, 1908, complaining of frontal and occipital headache, pain in back, and soreness of muscles; there was some nausea; temperature was 103°, pulse 110, respiration 25. Kernig's sign present; tendon reflex absent; no retraction of head, strabismus, petechiæ, or convulsions. He was put to bed and given purge; ice bags to head and back of neck; morphine for pain.

On September 9 at 11 a. m. lumbar puncture was done; fluid was turbid, but ran freely; diplococcus present; 30 c. c. Flexner's serum injected. Temperature rose that evening to 101°; next morning to 102°, with acceleration of pulse and respiration. Serum was to have been repeated the morning of 11th, but he had convulsions at 1, 1.15, 1.30, 10, 11, and 11.30 a. m. and died at 2.05 p. m.

Autopsy showed pus in both cornua and hemispheres, and also large amounts in marginal convolutions with small spots on surface of brain; purulent fluid under arachnoid; slight adhesions of meninges.

Seven days later *case No. 6* occurred in H. J. R. (A. S.), age 17 years 3 months. Patient presented himself at sick call September 15, complaining of headache, stiffness in neck, vomiting; temperature 102°; Kernig's sign present, tendon reflex absent, slight strabismus and deafness. Heart murmur was discovered, and five days after admission to the list mild pneumonia commenced. Patient improved and seemed to be convalescing. His temperature was normal for one week, and there was only slight elevation of the pulse and respiration rate, but he suddenly collapsed and died 10.10 a. m., October 9, 1908.

Autopsy showed cerebro-spinal fluid perfectly clear, but there was an organized pus clot in right ventricle, the membranes of brain were slightly adherent, and there was a pneumonic spot in right lung. The microscope showed diplococcus intracellularis meningitidis in pus clot from brain.

This case from start to finish was seemingly very mild, notwithstanding the heart murmur and pneumonia. At no time did any alarming symptom show itself. Much of the time the temperature was normal and the pulse and respiration not more accelerated than is usual with pneumonia and an organic heart murmur. The case was treated symptomatically and was practically convalescent, temperature having been normal a week, when the end came like a flash of lightning without the least warning.

On November 1, forty-seven days after the above patient was taken sick, *case No. 7* was admitted.—R. I. H. (O. S.), age 21 years 2 months, was taken ill with "grippe" October 28, but the next day the temperature and respirations dropped to normal and he seemed well. On October 31 at 8 p. m. his temperature jumped to 102°. The next morning he developed frontal and occipital headache, restlessness, slight delirium, Kernig's sign, internal squint both eyes, petechial spots; lumbar puncture demonstrated thickened spinal fluid and the microscope showed the diplococcus.

Under treatment patient improved. Temperature returned to normal the next morning and remained so till 6.30 the next day, when he suddenly collapsed and died in thirty minutes.

Autopsy showed large amounts of pus on the surface of the brain, and cloudy cerebro-spinal fluid in ventricles. Ante-mortem clot right side of heart. Scars and fibrous tissue of arrested tuberculosis in the apices of both lungs.

Two days after the foregoing patient was taken ill *case No. 8* occurred in W. A. H. (A. S.), age 19 years 1 month. He was taken ill November 2, with chill, frontal and occipital headache, soreness of muscles, temperature 104° , pulse 114, respiration 27. At 9 a. m. the following day he had developed deafness, stupor, and petechial eruption over chest and back; muscular stiffness of neck, trunk, and limbs increased; there was great retraction of head. Lumbar puncture was done and 40 c. c. of turbid spinal fluid was withdrawn, in which diplococcus was found; 30 c. c. antimeningitic serum was injected, followed the next day by 10 c. c., and some days later by another injection of 30 c. c.

This case made a seemingly perfect recovery after an illness of thirty days, and was discharged to duty December 3, 1908. On January 18, 1909, forty-six days after being discharged to duty, this case relapsed and came to sick call with mild frontal headache, slight nausea, and temperature of 101° . Later pains in back of neck and Kernig's sign developed, and the headache became rapidly worse, especially in the left temporal region. The temperature jumped to 103.5° , pulse to 114, respiration to 30, and mild delirium supervened. Lumbar puncture showed slightly cloudy spinal fluid in which was found the specific organism, but subsequent punctures withdrew perfectly clear spinal fluid containing the diplococcus. On the 24th, 30 c. c. Flexner-Jobling serum was injected, and again on the 27th, 29th, and 31st without apparent amelioration of the condition. This case died February 4 after an illness of eighteen days.

Autopsy showed pus in third ventricle, on medulla oblongata, and under membranes of cord; adhesions of membranes along great longitudinal fissure. Cerebro-spinal fluid cloudy and much increased in quantity; diplococci in pus from cord and fluid from ventricle.

Five days after the above case was taken ill *case No. 9* occurred in E. N. D. (A. S.), aged 17 years 2 months. He was admitted November 7. This case was an exact duplicate of the preceding one, save only that the initial temperature was higher (105.5°) and the pulse and respiration rates lower. On the first day 20 c. c. of serum was injected into the spinal canal, followed the next day by an injection of 25 c. c. This case made a perfect recovery after an illness of twenty days.

Case No. 10 was taken sick three days after the above was admitted, and was that of M. L. B. (A. S.), age 18 years 6 months. The patient appeared at sick call on November 10, complaining of headache, chill, and nausea. He was immediately put to bed; temperature 103° , pulse 110, respiration 30, Kernig's sign present, petechial eruption on abdomen, muscular rigidity, weak back and limbs, faintness. Lumbar puncture was done and 20 c. c. spinal fluid withdrawn. *Diplococcus intracellularis meningitidis* present. Thirty c. c. antimeningitic serum were injected into spinal canal. The following day the patient became more delirious and all symptoms became aggravated. Lumbar puncture was performed a second time and 40 c. c. serum injected. Patient's condition continued to grow worse, and he died at 11.20 p. m., November 12, two days after admission.

Autopsy showed the brain membranes adherent, sero-purulent fluid in ventricles, pus on surface of brain, inflammatory congestion of both lungs, and ante-mortem clot in heart.

Thirty-six days later *case No. 11* was admitted, and was that of C. O. K. (A. S.), age 18 years 7 months. The patient appeared at sick call at 9.30 a. m., December 16, complaining of headache, vomiting, pain in back and muscles, etc. Temperature was 103.5°, pulse 130, respiration 30. Three hours later the temperature rose to 105.5°; no change in pulse or respiration. Coma developed and deepened, accompanied by muttering delirium, the vomiting of feculent smelling fluid, and by involuntary stools, etc. Performed lumbar puncture and withdrew 25 c. c. spinal fluid, in which the diplococcus was found. Thirty c. c. antimenigitic serum was injected, but the patient died at 8.30 a. m., December 17, twenty-three hours after he applied for treatment.

Autopsy showed foci of pus and adhesions at vertex, and large amounts of pus under membranes the whole length of spinal cord.

Comment.—The clinical charts show several interesting features, the most important being: First, the lack of correlation between pulse and temperature curves, and, second, the absolute unreliability of the temperature curve as a means of prognosis. Many cases became more and more grave, though the temperature was running normal or thereabouts, some finally dying in spite of the fact that the temperature had been normal for days or weeks.

The two symptoms upon which a favorable opinion may be most reliably based are: First, subsidence of pain, and, second, increasing lucidity and coordination of mental processes.

A word as to the retraction of the head: The greater the retraction the more the evidence of the spinal invasion and possibly the more localized the infection. Every case which recovered at this station manifested this symptom to the extreme. None of the cases which died showed it to any marked degree.

The Flexner-Jobling serum was administered in 6 cases, of which 3 died; 1 recovered with total deafness; 1 recovered to all intents and purposes perfectly, but relapsed forty-six days later and died seventeen days after the relapse; and 1 was entirely restored to health. The presence of the diplococcus in the clear spinal fluid of the relapsed case (No. 8) would seem to indicate that, though the spinal fluid clears up under the use of the serum, the diplococcus is not eradicated and, further, that it retains enough morbid power to reproduce the disease after a seemingly complete recovery following the use of the serum. From the limited experience in these 4 cases and taking into the consideration the quickness with which the end came in the fatal cases, I think it would be illogical and injudicious to venture an opinion as to the efficacy of the serum; nor at this time would such an expression be fair to Doctors Flexner and Jobling or the writer. It may be said, however, that the writer has observed no dangerous symptoms from reaction or pressure in the use of the serum, even in those cases from which spinal fluid could not be withdrawn and that he is strongly biased in its favor, with belief that its potency is greater in proportion to the predominance of spinal over cerebral symptoms.

CURRENT COMMENT.

It is to be remembered that in the publication of these comments the bureau does not necessarily undertake to indorse the opinions expressed, but will lend the pages of this section to discussion of such contemporary topics as will be of interest and value to the service.

GANGOSA IN HAITI.

In his annual report on the U. S. S. *Dolphin*, Passed Asst. Surg. N. T. McLean, U. S. Navy, mentions the observation of what he believes to have been this disease on the occasion of a visit to the hospital at Gonaives, Haiti. He writes that in one of the native wards of this hospital two cases were seen which, clinically, showed all the symptoms of gangosa. Inquiry at Port au Prince elicited the information that there are a number of such cases at that place, but the short stay of the *Dolphin* at the latter port precluded further investigation. Doctor McLean's service at Guam and his familiarity with the disease in question, and, moreover, the fact that it has hitherto been considered as confined to the Marianne group of islands in the Pacific or of very limited distribution, makes this observation of particular interest and deserving of further inquiry.

HOOKWORM DISEASE IN RECRUITS FROM THE SOUTHERN STATES.

An interesting observation was reported to the Medical Department of the United States Army some weeks ago, which resulted in the issue of a special letter of instruction to all medical officers of that service. It seems that in the thorough reexamination of a number of recruits received at Fort Slocum, from some of the Southern States, a surprisingly large per cent of them showed the specific evidence of hookworm disease in their feces. The general appearance of a number of recruits in previous drafts from the South had made the examining surgeon suspicious of uncineriasis and suggested the advisability of establishing the rather unusual recruiting-office procedure of examining the stool. The investigation of the draft in question resulted in the following findings and bear an important lesson. In

all, 19 were examined, of whom 16 were positive for ankylostoma, representing a percentage of 84+ infected. This may have been a coincidence—yet, with due regard for the dictates of preventative medicine, it should not be regarded as such. The incident deserves careful notice by the navy as well as the army, and its possible portent should put medical officers on guard with respect to recruits from a section of the country which may be more extensively infected with this disease than is realized.

CARE OF EARS AND EYES IN THE JAPANESE NAVY.

In a memorandum from the Office of Naval Intelligence, February 19, 1909, the Bureau of Medicine and Surgery was advised that the Japanese Gunnery Drill Book requires gun pointers, when firing, to have ear protection and, from time to time, to wash their eyes with dilute boric acid.

THE QUESTION OF EAR PROTECTION IN THE BRITISH NAVY.^a

The Admiralty have issued a memorandum stating that, as a result of trials of various forms of ear protectors, it has been decided that the form of ear protection to be used during gun fire may be left to the individual choice of the officers and men concerned. A preparation called "antiphone," which has been tried with satisfactory results, may, the Admiralty state, be supplied to ships and gunnery schools for the purpose if specially demanded, the material being obtained from the medical officer as required by the persons using it. "Antiphone" may be used as supplied, an admixture of cotton wool or other similar material being considered unnecessary. It should first be warmed in the fingers a little to make it soft, and should then be molded to the shape of a truncated cone, and after being applied to the external auditory canal the base should be flattened over the adjacent folds of the cartilage of the ears.

REPORT RELATIVE TO A SERIES OF EXPERIMENTS CONDUCTED ON BOARD THE U. S. S. OHIO, DURING TARGET PRACTICE, WITH "PLASTICINE" FOR THE PROTECTION OF THE EAR DRUMS DURING HEAVY GUN FIRE.

By SURG. W. M. GARTON, U. S. NAVY.

"Plasticine" is a molding or modeling clay and, according to instructions, cotton wool is thoroughly incorporated with it, which gives it a greater tenacity and holds the mass together.

^a Memorandum from the Office of Naval Intelligence, February 11, 1909, being an extract from the London Times, February 2, 1909.

Before describing the tests it is well to state that it is hard to overcome the long-time and well-impregnated idea that cotton is paramount for ear protection, and especially the impression of the amount of protection afforded by the application of cotton wool in the fossa of the antihelix of the ear instead of the canal.

Both in calibration and battle practice the tests were conducted, and the latter was especially valuable, as this year it simulated general action very closely.

Different positions as regards the muzzle as well as different caliber of guns were chosen for the different wearers so as to compare plasticine to all the various tests to which the Elliot ear protector was subjected.

The following were the methods used not only by myself and other officers but by several enlisted men of the different gun crews:

- I. Plasticine in one ear only.
- II. Plasticine in both ears.
- III. Plasticine in one ear and cotton in the other.
- IV. Plasticine in one ear and protector in the other.
- V. Plasticine in one ear and putty in the other.
- VI. Plasticine as regards commands.
- VII. Plasticine as regards simplicity and application.
- VIII. Plasticine as regards after effects and dangers.

Undoubtedly plasticine affords great protection, as ascertained under first and second tests, and more so than cotton in that the shock is decidedly less.

In the fourth test, as compared with the Elliot protector, there is no doubt that the latter completely surpasses plasticine, so much so that officers who have been using the protector since my last tests were with difficulty persuaded to let the plasticine remain, complaining that it was uncomfortable and irritating and that ordinary conversation was not distinctly heard.

As plasticine resembled putty very closely, I prepared some of the latter in the same way as the former, and found it to be slightly heavier and bulkier, but affording the same protection.

Test six, that of clearly hearing commands, which is of utmost importance, next to protection, shows the relative value as follows: First, protector; second, cotton; third, plasticine; fourth, putty.

It was noted that after big gun fire the hearing was diminished to a greater or lesser degree, and a longer time to regain normal conditions was required in direct cotton, putty, plasticine, or protector used in the tests.

The incorporating of cotton wool with plasticine by kneading and the selection of the proper amount requires some care. The danger of small particles being left behind and acting as foreign bodies when the former is not thoroughly performed and the irritation to the canal

when the proper amount is not chosen are factors that reduce its simplicity and is liable to be followed by painful sequela.

In conclusion, it can be safely stated that plasticine is better than cotton, but is preferable to the Elliot ear protector in cost *only*.

HYGIENIC RULES, WITH PARTICULAR REFERENCE TO VENEREAL PROPHYLAXIS.

(Translated from the Report of the Bureau of Medicine and Surgery of the Austro-Hungarian navy, 1906-7, by Pharmacist Paul J. Waldner, U. S. Navy.)

The tremendous spread of venereal diseases in all walks of life and the resulting menaces to society have prompted all enlightened nations to take active measures against it. To this end the imperial navy has during the past eight years given the subject much thought and attention and the achieved results have fully justified the measures taken and firmly established the propriety of the methods. During the past four years in which personal prophylaxis has been practiced venereal disease has steadily decreased, as shown by the following figures:

Soft chancre:	Per 1,000
1902.....	33.2
1903.....	31.0
1904.....	27.3
1905.....	16.7
1906.....	17.7
1907.....	9.1
Gonorrhea:	
1902.....	55.9
1903.....	54.8
1904.....	39.0
1905.....	35.6
1906.....	28.9
1907.....	25.2

In all barracks and on board ship the following notice is posted for the crews:

1. Be moderate. Excess in eating, drinking, and sexual intercourse is not only directly responsible for sickness, but lowers the bodily resistance to disease invasions.

2. Avoid infection. After sexual intercourse carefully wash yourself. Upon your return to ship or barracks avail yourself of the prescribed preventive methods against venereal disease.

3. Do not spread disease. Do not visit persons who are sick with typhoid, scarlet fever, etc. You are apt to be infected or carry the disease to others.

4. Do not expectorate on the floor or decks. The material expectorated dries and is carried about with the dust and is inhaled and thus produces disease.

5. If you suffer with a venereal disease do not indulge in sexual intercourse, because it not only spreads the disease but is morally unscrupulous.

6. Go to the doctor when you are unwell in any respect and always when troubled with sexual disorders.

Medical officers are charged with the duty of instructing the crews in the nature of venereal infection and its results, and to point out the necessity for personal prophylaxis. It is fair to suppose that these educational measures will be carried out of the service by the men, and thus serve to educate the general population. In spite of the measures heretofore in practice, there still exists considerable venereal disease in the service, and particularly marked is the fact that syphilis has not decreased materially. This is no doubt traceable to the fact that the prophylactic measures on board ship are at times too late to entirely prevent infection. To partially overcome this defect it is intended that during the ensuing year small tablets of 5 per cent formalin soap shall be issued to all men going on liberty who apply for them, with directions to thoroughly wash the parts with this soap immediately after intercourse. As the results of this method have been very gratifying in the experimental stage, it is hoped that much good will result therefrom—not so much as the result of the disinfecting property of the formalin, but rather the process of washing. Moreover, as it is a soap known to have some medicinal virtue, it will appeal more strongly to the members of the crew than ordinary soap, and thus enhance its popularity.

The prophylactic measures heretofore in practice upon the return of men will, however, be maintained as heretofore.

On account of the tendency to decompose which solutions of protargol show, this preparation has been replaced during the past year with a 1 to 3,000 solution of oxycyanide of mercury for urethral irrigation, and as an external wash for the genitalia.

EXPERIMENTS WITH GONOCOCCIC VACCINE CONDUCTED ON BOARD THE U. S. S. OHIO.

By Surg. W. M. GARTON, U. S. Navy.

Fourteen cases of gonorrhea in its different forms were treated during the past six months by means of gonococcic vaccine.

The cases were taken as they occurred, without selection, and include 9 cases of the acute form, some of which were complicated by epididymitis, 4 cases of the chronic form, of several months' duration, and 1 case of acute gonorrhea with gonorrheal arthritis.

The vaccine was used in conjunction with other treatment, both local and internal, but in two of the acute cases all other treatment was omitted and the patients received the vaccine only. The results in these two cases differed very little from the results of the combined treatment. The only difference noted was that during the first few days those patients who received only the vaccine treatment experienced more marked discomfort from the acute symptoms of the disease.

The vaccine used was that prepared by H. K. Mulford Company, of Philadelphia, being a suspension of killed gonococci from "stock" cultures in normal salt solution and put up in 1 c. c. vials of 50,000,000 bacteria each.

As it is impracticable on board ship to carry out the procedures necessary to obtain the opsonic index according to Wright's method, the amount and frequency of dosage in these cases were regulated entirely by clinical symptoms. The usual initial dose was 50,000,000, and in some cases increased to 150,000,000 on the third dose. Very rarely was there more than the slightest appreciable reaction obtained, and the injection was repeated after from five to seven days. The injections were given into the muscles of the buttocks under strict antiseptic precautions, and with no bad results.

In the acute cases three to eight injections were given. These cases were undoubtedly benefited somewhat by this adjunct to the regular local and internal treatment, especially those which presented complications.

In four chronic cases more marked results were obtained. Three to six injections were given, and all symptoms disappeared after three to six weeks. One of these cases was of two years' standing, complicated by chronic prostatitis. He received four injections, and in five weeks was free from all symptoms. Six or eight weeks have elapsed since that time, during which the patient has indulged in alcohol and sexual intercourse without a return of symptoms.

The one case of acute gonorrheal arthritis accompanying acute gonorrhea showed the most gratifying results from this method of treatment. He had an unusually severe infection, and several joints were involved. Four injections of 50,000,000 each were given, with a complete recovery in about five weeks.

The results obtained so far in these few cases have been so satisfactory as to warrant continued treatment along these lines. We do not believe this treatment alone is sufficient, but as an adjunct to local irrigations and injections, and appropriate internal medication, it should prove of invaluable assistance in the naval service in the treatment of the more chronic forms of gonorrheal infections.

So much doubt has arisen lately as to the necessity of keeping track of the opsonic index in bacterial vaccine therapy, as well as the necessity for using autogenous rather than "stock" gonococci vaccine, that this method of treatment promises to be of real practical use. Perhaps a vaccine will eventually be produced containing cocci from several "strains" of the same organism, or to coin a word, "polyvalent" in its quality of affecting the leucocytes and producing opsonins. Then there will surely be no need for autogenous vaccines.

THYROIDAL ENLARGEMENT AMONG APPLICANTS FOR ENLISTMENT IN THE NORTHWEST.

By Passed Asst. Surg. W. A. ANGWIN, U. S. Navy.

During the year 859 men were examined for enlistment at Puget Sound, Washington. Three hundred and seventeen (43 per cent) of first enlistments were accepted without waiver. There were 379 rejections for various disabilities.

A noticeable feature of the examination of recruits at this station is the presence, in a considerable proportion of the candidates, of thyroid enlargement. On inquiry, goiter (generally without exophthalmos) was found to be quite common in local civil communities, especially among young females. The cause assigned by the natives is the consumption of snow water. Although there was among those examined an appreciable increase of the number of goiters in the spring and summer months, this was attributed to the increase of the number of locally born candidates for examination due to the presence there of the Atlantic Fleet. After the departure of the fleet the percentage of locally born candidates decreased.

The following chart shows the various percentages in three arbitrary divisions of the recruits:

Thyroidal enlargement.

	Total number exam- ined.	None.	Very slight.	Slight.	Marked.	Very marked.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
I. Natives of Washington.....	30	10	13	40	23	13
II. Natives of Northwest (Michigan, Wisconsin, Minnesota, North Da- kota, South Dakota, Montana, Wyoming, Idaho, and Oregon)...	79	16	21	40	19	2.5
III. Natives of other States.....	113	37	21	30	9	0.8

Of Class II (northwesterners) the "Very marked" and "Marked" varied in their length of stay in this State from "transient" to "eleven years;" of Class III (other States) from "transient" to "seven years." The length of residence varied indiscriminately in the several divisions among the three classes above from "transient" to "twenty years," and did not seem to be an influencing factor. Different sections of this State were about equal in the percentage of "Very marked" and "Marked."

PROGRESS IN MEDICAL SCIENCES.

LABORATORY.

STERILIZATION OF CATGUT.

By Passed Asst. Surg. HAROLD W. SMITH, U. S. Navy.

Several requests for the method of preparing catgut in use at the Naval Medical School Hospital have been received by the writer, and for this reason the technique is given in detail. The method is essentially that proposed by Willard Bartlett and is extensively used.

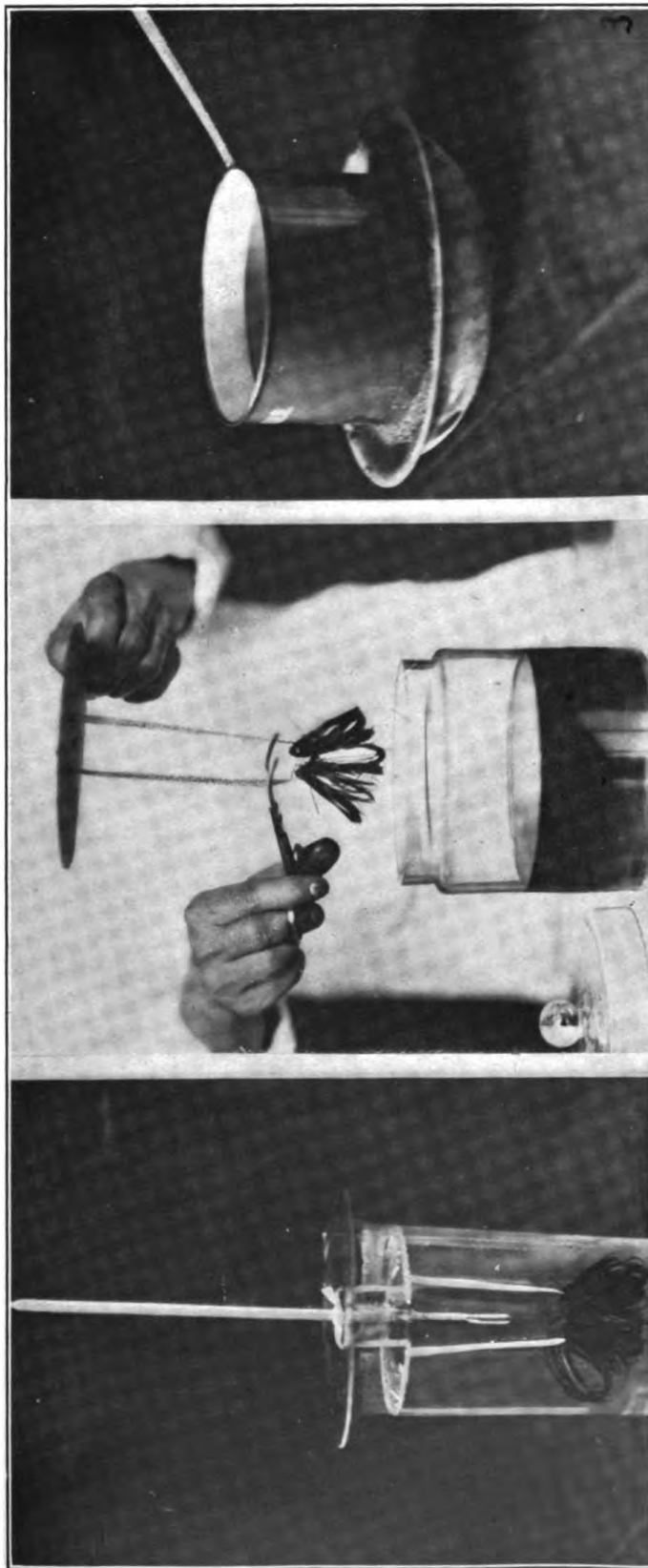
The advantages of the method may be briefly summed up as follows:

1. Absolute sterility is assured, heat being the agent and all handling being avoided.
2. There is little or no loss of tensile strength of the gut.
3. The method is cheap.
4. The method is easy of accomplishment.
5. All the materials and utensils are everywhere available.
6. The gut does not soften disagreeably while being used.
7. The absorbability is not affected by the method.
8. Any process of hardening the gut (chromicising) may be carried out before sterilization.
9. Gut is always at hand in any quantity during an operation.

The one disadvantage is that the gut is not stored in a form suitable for transportation or rough handling.

Raw catgut is obtainable from any dealer in surgical supplies in the form of coils or skeins, each piece being usually 10 feet in length. Sizes Nos. 0, 1, and 2 are sufficient for all but rare instances. It has been found here that Nos. 0 and 1 (plain) and Nos. 1 and 2 (chronic) suffice for all needs. The smooth is more easily handled.

Two steps are essential to preserve the quality of the gut. First, the gut must be absolutely dried in a desiccator, or oven, but care must be used not to burn it. If the door to the galley oven is left open and the gut is not allowed to touch hot metal the gut may be dried in the oven very satisfactorily. If any moisture is left in the gut the heat applied during sterilization changes the collagen of connective tissue to gelatin. Secondly, the gut must be left soaking in oil until impregnation is complete; this may be seen by the "clear-



STERILIZATION OF CATGUT.

1. Method of suspending gut in beaker, showing thermometer in place.
2. Method of removing gut from jar.
3. Apparatus used in sterilizing the gut.

ing" of the gut, just as a microscopical section is cleared by oil or balsam.

It is unnecessary to say that only sterile instruments should be put in the sterile jar and no gut should be replaced. The iodine-alcohol takes no part in the sterilization of the gut, but simply provides against accidental air contamination. Since alcohol is not miscible with liquid petrolatum, the impregnated gut is not affected by the alcohol. Iodine is soluble in both alcohol and oil and some staining of the gut takes place apparently without other action. Methyl alcohol, or Columbian spirits, advised by Bartlett, forms with the iodine extremely irritating compounds which are disagreeable to those handling the gut and which interfere with the healing of wounds. It is well to avoid kinks in coiling the gut.

When catgut is dried after being wet it becomes kinked and snarled unless kept stretched until thoroughly dried. Hence it must be kept on a reel or some similar device after chromicising until it is dried. A simple form of reel can be made by a carpenter in a few minutes.

The jar for storage should have an overlapping cover, like a Petri dish, to guard against dust. (Fig. 2.) For convenience of illustration, a glass beaker is shown in figure 1; the apparatus actually used appears in figure 3. This vessel should be of sufficient diameter that the gut may be withdrawn without touching the sides. The source of heat may be the galley range, a gas stove, or a Bunsen burner. Gas is more convenient in that it may be controlled and a constant temperature maintained with little attention.

DETAILS OF METHOD.

1. Cut catgut, each length into four pieces, of any desired length.
2. Take three pieces and coil around four fingers.
3. Suspend coils, properly arranged as to size and labeled, from pasteboard by properly adjusted string. (Figs. 1 and 2.)
4. Put in hot-air oven; keep at 200° F. for one hour; keep at 230° F. for one hour.
5. Transfer quickly to benzine after two hours. (No. 5 may be omitted.)
6. Transfer to liquid petrolatum. Set oil and catgut on steam radiator, and leave (covered) for forty-eight hours, until gut is "cleared."
7. Heat on sand bath, with thermometer in oil above level of coils. (See figs. 1 and 3.)
 - (a) Raise temperature slowly to 230° F.
 - (b) Let remain at approximately 230° F. for six hours.
 - (c) Raise temperature slowly to 280° F.
 - (d) Let remain at 280° F. for one hour.
 - (e) Let cool where it will not be disturbed.

Keep throughout a fifteen-minute record of temperature.

8. Take a jar; sterilize one hour by steam at 250° F. Fill half full of alcohol (collected in a sterile graduate) containing one-fourth of 1 per cent iodine crystals. Boil one pair of scissors and a pair of dressing forceps.

9. Lift gut out of oil by pasteboard cover, avoiding all contact; hold over storage jar; with sterile scissors cut suspension tape close to gut, which then will drop into jar. (Fig. 2.)

To chromicise gut, tie pieces of raw gut together in one long piece; wind on reel; immerse in 1 to 4,000 chromic acid for eighteen hours. Let dry thoroughly on reel. Cut in pieces about 2 feet long; coil, and proceed from this as with raw plain catgut.

CHEMISTRY AND PHARMACY.

Asst. Surg. E. W. BROWN and Pharmacist P. J. WALDNER, U. S. Navy.

FLUIDGLYCERATES, PHARMACEUTICAL, AND PHYSIOLOGICAL ASPECT—A REVIEW.

BERINGER, GEORGE M. *Fluidglycerates*. Merck's Report, March, 1907.

RIPPETOE, JOHN R. *The physiological action of fluidglycerates of digitalis and ergot*. Amer. Jour. Pharmacy, February, 1909.

Since the presentation of the subject of fluidglycerates before the New Jersey Pharmaceutical Association Mr. Beringer has conducted further experiments, covering in all nearly one hundred drugs, with the glycerol-water menstruum as a substitute for the alcohol and hydro-alcoholic solvent for the active principles of drugs. The preparations which he proposes are to have the same strength ratio as the fluid extracts now official. It is proposed to employ the glycerol-water with drugs, the active principles of which are readily soluble in glycerine and which, with alcohol as a solvent, load the resulting tincture or fluid extract with inert extractive, which is objectionable pharmaceutically and useless medicinally. Glycerin being a solvent for many of the sweet, bitter, astringent, and essential flavoring constituents, as well as possessing a marked solvent action on many alkaloids, glucosides, and neutral principles, seems well adapted for use with drugs having these constituents. Mr. Beringer's experiments have shown that a 50 per cent glycerin content in the finished product is necessary to insure a permanent preparation, a lesser percentage of glycerin involving a risk of decomposition. The following process is given as a "type" applicable to almost all of the suitable drugs: •

The drug in coarse powder	gm.	100
Glycerin	c. c.	50
Distilled water	c. c.	150
Chloroform water, a sufficient quantity to make of the finished product	c. c.	100

Mix the glycerin and distilled water and moisten the drug thoroughly with a sufficient quantity of the mixture, and then pack it very lightly in a cylindrical percolator and saturate thoroughly with menstruum; cork up and cover the percolator, and allow to macerate for two days, then continue to percolate until the drug is exhausted, using first the remainder of the menstruum and then chloroform water. Reserve the first 50 c. c. of percolate and set this aside. Evaporate the remaining percolate on a water bath, the weaker portion first, then the stronger until reduced to 60 c. c., and then add the reserve, and continue the evaporation until the product measures 100 c. c. If evaporation has been carried too far, make up to 100 c. c. with distilled water. Set the product aside for several days to settle; decant the clear supernatant layer, and strain the remainder through muslin.

For some of the alkaloidal drugs the addition of an acid to the menstruum to insure extraction was deemed essential, and in these the same acid was not used throughout, but a selection was made that in each case appeared to be the most appropriate to insure extraction with the least amount of decomposition of the alkaloids.

The object of the chloroform water is to avoid or prevent fermentation while the last portions of percolate are forced out. The chloroform is completely dissipated by the subsequent evaporation.

The advantages claimed for this class of preparations are that they are particularly suitable for making infusions, being readily miscible with water without precipitation, and this is being recognized as a most effective method of drug administration; that they obviate the employment of alcoholic preparations in cases where alcohol is clearly contraindicated; that they can be readily and economically prepared on a small scale. Pharmaceutically, these preparations would seem to be a decided improvement on fluid extracts, but the larger consideration, i. e., their therapeutic value, is yet to be demonstrated. Mr. Beringer has expressed the hope that they may be subjected to physiological and chemical tests to determine their medicinal worth.

Mr. John R. Rippetoe has done some work in this line, using ergot and digitalis. Parallel tests were made using a 10 per cent tincture of digitalis made with a menstruum of dilute alcohol and a fluidglycerate of the same percentage strength. For ergot he employed a 50 per cent dilute alcohol extraction, containing 1 per cent acetic acid in the menstruum, and a 50 per cent fluidglycerate containing the same amount of acetic acid. The digitalis preparations were used on frogs. The hydro-alcoholic preparation required 0.005 c. c. per gram weight of frog as the minimum lethal dose, while 0.025 c. c. of the fluidglycerate per gram weight were required to produce the same result. This test was a fair quantitative test, and would indicate that the hydro-alcoholic preparation of digitalis is five times as potent as the glycerin preparation. The ergot preparations were used on roosters by injecting them into the thigh

muscles. The hydro-alcoholic extract produced a typical darkening of the comb, whereas the glycerin preparation produced only a slight paling. Duplicate tests were made in both instances. These experiments, while not conclusive, indicate that as regards these two drugs, the fluidglycerates do not give the same marked physiological action as the hydro-alcoholic preparations. The investigator states, however, that possibly they possess other therapeutic value which may be better shown by clinical tests.—(P. J. W.)

WILLCOX, W. H. **The importance and significance of the chemical examination of the gastric contents after a test meal, with a new method for estimating the ferment activity of the gastric contents.** *Lancet*, 1908, 25 July, 2 vol., pp. 220-224.

For the test meal the author recommends tea with sugar and milk and buttered bread. Excessive quantities of albumin are impracticable, since too much HCl is combined.

The points of importance in the examination are: (1) Total acidity. (2) Total HCl and (a) free HCl by the Gunzburg method. (b) HCl in combination with albumin or organic bases; this latter is of the greatest importance. One can easily estimate it, since from two similar tests of the gastric juice one is made alkaline with soda and then by the Volhard method, after drying and ashing, the chlorides are determined. The total HCl is determined in the other. The difference gives combined HCl very accurately. In one case one finds the total HCl, combined with both proteid, organic, and inorganic bases, in the other only those combined with inorganic bases. The difference is the combined HCl. In stomach ulcer and superacidity the combined HCl is equal or almost equal to the total acidity. In cancer of the stomach it is less. In chronic gastritis it is ordinarily subnormal. The normal amount is 0.15 per cent. (3) Organic acids, especially lactic acid, which really has no differential diagnostic interest. (4) Mucin. (5) Sulphocyanate test to see if the existing mucin originates from saliva or from the stomach. (6) Fermentive activities. From the old method of Mett, Grützner, Lenze, and others, a new method has arisen that is founded upon the fact that rennet and pepsin are present in constant proportions. One can now easily estimate the rennet quantity, when to equal quantities of uncooked milk are added increasing quantities of gastric juice, and it is noted at what concentration at 40° C. in thirty minutes coagulation results. This indicates the relative amount of pepsin present.

A description of the detailed results obtained by this method is given.—(E.W.B.)

MÜLLER, EDUARD. **Demonstrations of enzymes and antienzymes, particularly ptyalin, trypsin, and antitrypsin, and the proteolytic salivary enzyme.** *Breslau, Verhandl. Kongs. im. Med.* 25, 676-685, April, 1908.

The author's method consists in bringing a drop of the material to be examined upon the surface of a serum plate (cf. Müller and Jochmann, *Verhandl. Kongs. im. Med.* 24, 266) made up of solidified blood serum in a Petri dish. A depression is formed when proteolytic enzymes are present. He now shows that plates of starch paste can be used to detect amylolytic enzymes. Normal human saliva contains a proteolytic enzyme derived from the leucocytes (the so-called "salivary corpuscles"). Nasal mucus and colostrum contain protease from the same source. The serum-plate method can be used to detect the secretory function of the pancreas by examining the feces for trypsin. Normally only traces are found in the rectum, but when a purgative is administered trypsin is found, except in cases where the pancreas fails to function. Intestinal juice is inactive on such serum plates, as is pepsin (in alkaline solution). Trypsin can be distinguished from leucocyte ferment (derived from pus) by adding serum of cold-blooded animals to the suspected material. It contains an antitrypsin, but not an antileucoprotease. The starch-paste plates are prepared as follows: Starch (about 10 per cent) is allowed to swell in water for one or two days at about 55°. It is stirred and poured into Petri dishes and put in an oven at 85° to 90°. In one to two hours a thick, firm paste has formed, and the superabundant water can be poured off. The absolute content of ptyalin in human saliva seems to depend mainly upon the quantity of saliva. The contents of the small intestine are considerably richer in amylase than those of the large intestine. The method is particularly valuable in view of its easy chemical application.—(E. W. B.)

WELLS, H. G. **Studies on the chemistry of anaphylaxis.** *Path. Lab. Univ. Chicago Proc. Expt. Biol. Med.*, 6 advance sheets.

Purified egg albumin produces anaphylaxis reaction. It sensitizes in doses of one twenty-millionth gram, fatally in doses of one one-millionth gram. The minimum lethal dose for sensitized pigs is about 0.5 mg. by intraperitoneal injection and about 0.1 to 0.05 mg. when injected into the circulation. The minuteness of the minimum sensitizing and intoxicating dose of pure protein seems to indicate that both the sensitizing and intoxicating agent are one and the same kind of protein molecule, or else two different constituents of the same molecule. Gelatin does not produce this reaction. Milk or serum heated to 100° for thirty minutes do not lose their anaphylactic properties. Pure zein^a is actively and specifically anaphylactic.

^a Zein is a proteid constituent of corn, soluble in alcohol.

Gliadin^a has but slight anaphylactic power. Iodization of different specimens of serum by a constant method did not yield constant results. Iodized egg albumin retains its specificity unaltered, but seems to lose much of its toxicity for sensitized guinea pigs, nor does it sensitize well to egg albumin. Both sensitizing and intoxicating principles are attacked by typtic digestion of serum, and slowly decrease in strength as the coagulable protein disappears.—(E. W. B.)

BACHMANN, E. The clinical value of viscosity determination. Med. Klin. Univ. Zürich. Deut. Arch. Klin. Med. 94, 409-425.

Like the determination of hemoglobin, that of viscosity is an aid to clinical diagnosis. The data from 400 cases form the basis of the following conclusions. In pneumonia, the viscosity is increased as compared to hemoglobin, hence the quotient $\frac{\text{hemoglobin}}{\text{viscosity}}$ (see following article) is low. A differential diagnosis between pneumonia and typhoid can be made on the viscosity, since in typhoid this is decreased, and the quotient is markedly high. In meningitis the viscosity is high, the quotient low. Pneumonia and meningitis, with high viscosity, are accompanied by leucocytosis. Typhoid, with low viscosity, is accompanied by leucopenia. Cases of encephalorrhagia and thrombosis show viscosities varying from the average to the highest, due probably to the defective respiration and an accumulation of CO₂ in the blood. Determination of the viscosity in other diseases, especially those of the heart, with the application of the quotient $\frac{\text{hemoglobin}}{\text{viscosity}}$, will, it is believed, yield valuable results.—(E. W. B.)

HESS, W. The viscosity of the blood. Zürich. Deut. Arch. Klin. Med., 94, 404-S.

An examination of 250 individuals shows the average viscosity of the blood of adults to be 4.57—in men 4.74, in women 4.40. Above 50 years both these latter values tend to approach 4.6, while the values for children, although lower, are also not far apart—3.89 for boys and 3.80 for girls. Variations greater than 20 per cent either way are probably pathological, due to changes in two factors, the soluble proteins of the plasma, and the number of the corpuscular elements. Frequently, therefore, instead of the viscosity alone, the quotient $\frac{\text{hemoglobin}}{\text{viscosity}}$ is a finer and more trustworthy indication of a pathological condition of the blood. A value of 17-21 is normal for this quotient.—(E. W. B.)

^a Gliadin is one of the proteids of bread.

BLACK, O. F. The detection and quantitative determination of *B. oxybutyric* acid in the urine. Jour. of Biol. Chem., vol. 5, Nos. 2-3, p. 207, 1908.

The quantitative method outlined in this paper is too complicated for clinical application, but the procedure for the detection in urine is simple and should give a rough idea as to the amount of *B. oxybutyric* acid present. The principle of the reaction is the ready oxidation of the acid to diacetic acid and acetone in the presence of hydrogen peroxide and the production of a rose color on addition of dilute ferric chloride.

The color of urine and the presence of acetacetic acid and sugar all interfere with the test when applied to the urine directly. The following procedure, however, has been found to give the required result and can easily and quickly be carried out. Five to 10 c. c. of the urine under examination are concentrated in an evaporating dish at a gentle heat to one-third or one-fourth of the original volume, which eliminates the acetacetic acid. The residue is then acidified with a few drops of concentrated hydrochloric acid and made to a thick paste with plaster of Paris and allowed to stand until it begins to set. It is then stirred and broken up in the dish with a blunt-ended stirring rod. The porous meal thus obtained is extracted twice with ether by stirring and decantation. The ether extract, which contains *B. oxybutyric* acid, is evaporated spontaneously or on the water bath.

The residue is finally dissolved in water, neutralized with barium carbonate and two or three drops of ordinary commercial hydrogen peroxide added in a test tube and mixed by shaking. A few drops of 5 per cent Fe Cl_3 are added, and on standing for a few seconds a beautiful rose color develops.—(E. W. B.)

GOODMAN, E. H., and STERN, S. A new method for the quantitative estimation of albumin in the urine. Jour. Amer. Med. Ass., vol. 51, No. 24, p. 2055, December 12, 1908.

The authors emphasize the fact that a simple, rapid, and exact method for estimating the quantity of albumin in urine is urgently needed.

About a year ago Tsuchiya (Zentralbl. fr. inn. Med. 1908, p. 105) suggested a modification of the standard Esbach solution in the form of a solution of phosphotungstic acid in 96 per cent alcohol and hydrochloric acid. He summarized his conclusions as follows: (1) With normal urine there is no precipitate, as is sometimes the case with the Esbach reagent; (2) the precipitate settles more regularly than with the Esbach solution. Foaming or floating of the precipitate is never seen; (3) the method is more exact with moderate room temperature than is the Esbach method; (4) small amounts of urine are precipitated as well as are the larger amounts. This is

especially important for febrile urines, as Esbach himself said his method was not suitable in these instances.

The authors have adopted the solution of Tsuchiya as the basis of a titration method described as follows: A solution is made up containing 1.5 grams of phosphotungstic acid and 5 c. c. of concentrated hydrochloric acid in sufficient 95 per cent alcohol to make 100 c. c. Five c. c. of this solution are placed in a test tube, and then with a 2 c. c. pipette graduated in tenths of a cubic centimeter the filtered urine is added to this, shaken after the addition of each tenth of urine until a whitish cloud appears.

The phosphotungstic acid solution was found to precipitate exactly 0.0001 gram of albumin. Therefore if 0.7 c. c. of a diluted urine (1 in 10) were used, then 7 c. c. diluted urine equals 0.0001 gram albumin and 7 c. c. of undiluted urine equals 0.001 gram or 700 c. c. urine equals 1 gram of albumin or 1.42 grams per thousand.

The Heller test is always made at the beginning, and if much albumin is present the urine is diluted 1 in 10. The method was in all instances controlled by weighing estimations, and in addition determinations with the Esbach albuminometer, using both the Esbach and Tsuchiya solutions. The method is emphasized as being startlingly simple and exact, in but few instances varying from the gravimetric method.—(E. W. B.)

Concerning the diagnostic value of Cammidge crystals in pancreatic diseases.

From the Osped. Maggiore of Verona, Il Morgagni, September, 1908, Nr. 9.

The authors have tested the Cammidge reaction in 12 cases. They found the crystals in all (5) cases, in which, by operation or autopsy, the pancreas was found to be affected. When the crystals did not appear the pancreas was normal. It was interesting that in some cases the onset of inflammation in the formerly normal organ was shown through the positive nature of the previously negative reaction. The crystals were not always alike. One case of pyæmia strangely gave a positive reaction, and the autopsy proved the presence of a suppurative focus in the head of the pancreas.—(E. W. B.)

SURGERY.

Surg. H. C. CURT and Passed Asst. Surg. H. W. SMITH, U. S. NAVY.

REVIEW OF ADVANCES.

Toxic effects of bismuth subnitrate.—Dr. Emil Beck's article on this subject in the Journal of the American Medical Association of January 2, 1909, should be read in order that the occasional toxic

effects of bismuth when used in sinuses and cavities will be understood.

Until recently the fact that even large doses of bismuth could poison was not known, and even now cases of poisoning seldom occur, and even more seldom among adults. The symptoms are blackening of the gums, ulcerations of mucous membrane, diarrhea, and nephritis. It seems that some form other than the nitrate should be used, and subnitrate should not be injected into the bowels, especially if intestinal putrefaction is present.

Much of the above refers to large amounts injected for X-ray purposes or when injected in large amounts and allowed to become encysted.

Cerebral decompression.—This is a subject of particular interest at present. It is used in an increasing number of pathological conditions and both Hartley and Cushing consider the operation in itself as practically without danger. Its value seems to be definitely determined, not only in the usual conditions for which it has been used, but in many cases of beginning optic neuritis, early choked disk, nephritis, and other conditions in which there is increased intracranial tension. See Dr. Frank Hartley's article in the *Journal of the American Medical Association* for January 9 and Dr. Harvey Cushing's article in the *Journal of the American Medical Association* of January 30.

The extent to which the procedure is approved by those who are authorities on eye diseases is another indication that this is one of the genuine advances in recent surgery.

It also emphasizes the need of early and skillful examination of the retina in all head injuries.—(H. C. C.)

OPERATIVE TREATMENT OF ACUTE GONORRHEAL EPIDIDYMITIS—A REVIEW.

HAGNER, F. R. **A further report on the operative treatment of acute gonorrheal epididymitis.** *Annals of Surgery*, December, 1908.

CUNNINGHAM, J. H. **Acute gonorrheal epididymitis, with special reference to the operative treatment.** *Boston Med. and Surg. Jour.*, Nov. 18, 1908.

The preliminary report on this subject was made by Hagner in March, 1906. The operation then described is as follows:

At a point over the juncture of the epididymis and testicle an incision 6 to 10 c. m. is made through the skin and parietal layer of the tunica vaginalis. After the serous membrane is opened all the fluid is evacuated and the enlarged epididymis examined through the wound. The testicle with its adnexa is delivered from the tunica vaginalis and enveloped with warm towels. The epididymis is then examined and multiple punctures made through its fibrous covering with a tenotome, especially over those portions where the enlargement and thickening are greatest. The knife is carried deep enough to penetrate the

thickened, fibrous capsule and enter the infiltrated connective tissue. When the knife is through the thickened covering of the epididymis a very marked lessening of resistance will be felt. If pus be seen to escape from any of the punctures, the opening is enlarged and a small probe inserted in the direction from which the pus flows, then by a backward and forward motion of the probe the opening is enlarged and the pus allowed to escape. By this method I believe there is a less danger of injuring the tubes of the epididymis than by cutting with a knife. After the probe is passed in, pus will be evacuated by light massage in the region of the abscess and a fine-pointed syringe is used to wash out the cavity with 1-1,000 bichloride of mercury, followed by physiological salt solution. The testis is then restored to its normal position, and in every case the tunica vaginalis is thoroughly washed with 1-1,000 bichloride, followed by normal salt solution. The incision of the tunica vaginalis is lightly closed with a running catgut suture, a cigarette drain of gauze is then applied over the incision, the skin being brought together with a subcutaneous silver wire suture, the cigarette drain passing out at the lower angle of the wound. Silver foil and a sterile dressing are now applied and the parts supported by a wide T-bandage.

The drainage is continued four to six days and in a week the wound is healed. The remarkable feature is the rapidity with which the induration, not only of the epididymis but of the cord disappears. * * * Pain is absolutely relieved on recovery from the anesthetic, * * * (and) * * * along with the decrease in leucocytosis is a parallel fall in the temperature curve and pulse. [Recovery is usually complete in an average of five days.] It can not be stated definitely whether this operation lessens the liability to sterility of the affected side.

The author tabulates 19 cases of his own together with two others.

Cunningham cites 7 cases operated on by Hagner's method, and also quotes Baerman (*Deutsche med. Wochenschrift*, 1903, no. 40) as follows: "* * * (4) Early puncture probably saves the canal of the epididymis from occlusion. (5) Draining the hydrocele improves the circulation in the testicle."

Cunningham's results are in accord with Hagner's and he concludes "That the operation advised by Hagner greatly lessens the suffering and diminishes the duration of the disease."--(H. W. S.)

ABSTRACTS.

BILLINGTON, WILLIAM. **Appendicostomy in diffuse septic peritonitis.** *The British Medical Journal*, January 9, 1909.

Doctor Billington first describes his experiences with the Murphy proctoclysis and expresses himself as not being satisfied with it, though considering the principle as good.

He therefore suggests that enteroclysis be practiced through the appendix instead of per rectum, as in the Murphy technique. When the peritonitis is from perforation of gastric ulcer, or some cause distant from the appendix, a separate opening is made at the site of the appendix and the usual fixation and drainage done.

When the general peritonitis is from an inflammation beginning in the appendix itself, the base, often uninvolved, is used for drainage. When it is necessary, because of gangrene, to remove all of the organ, a caecostomy is done and the irrigation practiced through that opening.

Doctor Billington considers that this method of irrigation necessitates a very few minutes extra time, that the quantity of fluid taken into the bowel can be accurately measured, that the entire large intestine takes part in the absorption, and that the application of this method is easier than the Murphy method.

It seems to the reviewer (1) that the Murphy method is almost invariably successful if carefully carried out, and (2) that the making of an additional abdominal incision and fixation of the appendix is just so much added to the often existing shock. On the other hand, if an additional opening (for drainage) must be made, the right iliac region is a favorite site in connection with the Fowler position and the procedure would not merit the same objections.—(H. C. C.)

STANTON, E. M. **Concerning the technic of skin grafting.** New York State Journal of Medicine, January, 1909.

In his summary the author says:

1. Graft either on a freshly cut, noninfected surface or on a clean, firm, granulating surface without curetting or interfering with this surface in any way.
2. Take the grafts from the individual to be grafted.
3. In the majority of cases a general anesthetic is unnecessary.
4. Spread the grafts directly upon the surface to be grafted, without first transferring them to normal salt or other solutions.
5. See that the grafts completely cover the area to be grafted.
6. Cut the grafts so as to use the deeper epithelial layers of the skin but not so as to include the connective tissue layer or corium. Grafts cut too thick have a whitish, opaque appearance, whereas properly cut grafts have a distinctly translucent appearance.
7. Dress with forty or more layers of plain sterile gauze held in place by narrow strips of adhesive plaster, and apply an outer dressing of cotton, held in place by a moderately firm bandage.
8. Change the dressing for the first time on the fifth day and after that as often as may be necessary to keep the wound free from purulent material.
9. Keep the grafted area at rest during the first week or ten days and if it is an extremity, elevate the same to lessen congestion of the part.—(H. C. C.)

JÜNGLING, O. **Treatment of hypertrophy of the prostate by injections of alien blood.** Deutsche Zeitschrift f. Chirurgie, November 19, 1908, XCV, No. 6.

It will be remembered that Bier has used injections of blood for the purpose of producing an aseptic inflammation in the treatment of delayed union of fractures and of malignant tumors. Following out this suggestion, Jüngling has employed alien blood to reduce pro-

static hypertrophy. Blood of one of the domestic animals is collected from the spurting vessels, at the moment the animal is slaughtered, in a flask containing some glass beads; the defibrinated blood is taken up in a 10 c. c. syringe, having a needle 10 cm. in length. The patient is placed in the knee-chest position and the needle is introduced into the prostate, utilizing a finger in the rectum as a guide. Into various locations in and about the prostate 10 c. c. of the blood are injected. One to four injections are made at intervals of ten days.

Twenty-one cases were treated. In all but 4 cases marked improvement followed, but the best results were obtained in cases with acute retention.—(H. W. S.)

GOODMAN, E. H. **The value of the Cammidge reaction in the diagnosis of pancreatic diseases.** *Annals of Surgery*, February, 1909, p. 183.

Goodman studied 62 cases of abdominal disorders; of these, 10 gave a positive reaction; of the 10, the diagnosis indicated by the reaction was confirmed by operation or autopsy in 7. The 3 remaining are described. "One case died with all the clinical symptoms of acute pancreatitis, and in the other two a concurrent pancreatic lesion was not improbable. In no cases other than those presenting clinical evidence was a positive reaction obtained."

Since reading the abstracted paper the author has made between 150 and 200 examinations, and the results were in harmony with the above conclusions.—(H. W. S.)

SPEESE AND GOODMAN. **The Cammidge reaction in experimental pancreatitis.** *Am. Jour. Med. Sc.*, Jan., 1909, p. 107.

The Cammidge reaction is so invaluable in differentiating affections of the upper abdomen and in indicating complications, providing the value claimed for it is established, that any experimental work confirming more or less imperfect clinical observation is welcome. The authors have been unable to find recorded any experiments dealing with the improved or "C" reaction, and record their results in a preliminary report.

Acute pancreatitis was produced in four dogs by the injection into the pancreatic duct of cotton-seed oil. The animals were killed eight hours after operation. The injection was attempted, but not accomplished in one case; the organ was not damaged and no reaction appeared. In the four successful cases the reaction was posi-

^a Previous bulletin references to the pancreas occur in vol. 2, No. 3, pp. 62, 79, 80, 81, and vol. 3, No. 1, p. 66.

tive after operation, and histological examination revealed varying degrees of necrosis. In two cases the urine was not previously examined, but observations by others have shown that the urine of normal men, dogs, and rabbits does not give the reaction.

In three cases the production of a nonacute pancreatitis was attempted by ligating the duct. In all three the urine was negative before operation. Autopsy on two cases showed subacute inflammatory changes, and the reaction appeared on the second and first days, respectively. The third dog died on the ninth day, but the reaction was constantly present on and after the fifth day.—(H. W. S.)

LEVERS, Capt. O., R. A. M. C. **The syphilis case sheet.** Journal of the Royal Army Medical Corps, November, 1908.

In the British and French armies there is kept an individual record of each case of syphilis, and this form accompanies the patient in all his transfers until the conventional course of systematic treatment has been completed—a consummation rightfully due the individual and indispensable to the efficiency of the service. Captain Levers suggests a modification of the form in present use, and states certain considerations which not only support his immediate contention, but also bear as well on the advisability of adopting similar forms in our own military service.

(1) (Granted that) a man has syphilis (the diagnostic symptoms should be noted to establish the fact definitely).

(2) That man is to have a course of treatment extending over a certain number of months. * * *

(3) That man, during his course of treatment, will come under several medical officers, each of whom, on taking over, will require to know exactly how long the man has been under treatment and what treatment he has had.

A completed specimen sheet covering two years' treatment is appended, in which appear:

In the heading—

(a) Data relating to identification.

(b) The date of diagnosis and the commencement of treatment.

In their respective columns, as weekly entries—

(c) Month and week (of disease).

(d) Weight. Albumin in urine.

(e) Progress and symptoms.

(f) Treatment.

(g) Hospital or out-patient.

(h) Station.

(H. W. S.)

CAPELLE. **The thymus in Basedow's disease.** Münch. med. Wochenschrift. 1908. IV, 1826.

Some skepticism has arisen of late regarding the importance attached within recent years to the parathyroids. That the parathyroids are necessary to life and that many of the fatalities accompanying thyroidectomy are due to injury or removal of these bodies are facts apparently established; but the observation that fatalities occur when the parathyroids have not been injured leads to search for other explanations. Deaths occur under general and local anesthesia alike, and it is not now considered that symptoms are produced by excessive absorption from exposed glandular surfaces.

"Thymus" deaths during anesthesia are not uncommon, and Capelle finds that pathological enlargement of the thymus is present in cases dying during operation or shortly afterwards. This is possibly a further instance, not hitherto studied, of correlation of the glands supplying internal secretion. From Capelle's statistics it appears that of 60 autopsy cases 79 per cent showed a hypertrophic thymus. The operative and post operative fatal cases invariably showed an enlarged thymus.—(H. W. S.)

OTT and SCOTT. **The effect of mammalian pituitary on tetany after parathyroidectomy, and upon the pupil.** N. Y. Med. Jour., Dec. 19, 1908, p. 1180.

Pogowitsch and other observers have found changes in the pituitary body after thyroidectomy and accompanying disease of the thyroid. The authors performed parathyroidectomy in several cats, which in about forty-eight hours was followed by tetany. The tetany was relieved in two hours by the injection of the pituitary extract. These facts, the authors conclude, indicate a relation between the pituitary and the parathyroids.—(H. W. S.)

MURPHY, F. T. **Hemorrhage in jaundice controlled by blood transfusion.** Bost. Med. and Surg. Jour., Dec. 24, 1908, p. 865.

Murphy gives a brief clinical history of a case of jaundice with spontaneous hemorrhages from the mucous surfaces. Packing, adrenalin, horse serum, and fresh rabbit serum were used without result, the coagulation time being increased 3 + times, — 13 + minutes by the Brodie-Russell apparatus.

The patient was nearly moribund when a transfusion was performed. Thereafter the coagulation time remained at 3 + minutes, and operation was performed (cholecystostomy); convalescence was normal except for slight bleeding on several occasions from mucous surfaces.

The success of transfusion is interesting, particularly after the failure of calcium and the recently recommended fresh sera.—(H. W. S.)

KOCH, DR. JOSEF. On the hæmatogenic origin of purulent nephritis through the staphylococcus. (From the Royal Inst. f. Infektionskr. in Berlin, Director Prof. Dr. Gaffky) Zeitschr. f. Hygiene and Infektionskr. Bd. 61, 1908, p. 301.

The tendency peculiar to the staphylococcus of forming metastases is a fact long since well recognized, since Lenbartz has shown statistically that in 22 cases of staphylococcus-septicæmia 95 per cent were followed by the formation of metastases, while out of 160 cases of streptococcus-septicæmia only 35 per cent were accompanied by metastases. In adult rabbits the intravenous injection of virulent staphylococci, the order of frequency with which metastases affect the different organs is: Kidneys, heart, lung, spleen, and bones; in young rabbits the bones are affected with a frequency equal to that of other organs.

For the genesis of metastases in the kidneys the fact that the cocci of the blood are eliminated through the liver and kidneys is of great importance. One of the most important distinguishing characteristics between strepto- and staphylo-cocci is that the latter produce a toxin which passes into the culture medium. The escape of such a toxin into living tissues is followed by a necrosis of these tissues, which then form one of the best culture media for the growth of the bacteria. The further fact that the passage of virulent staphylococci from the blood into the urine occurs only several hours after inoculation, would confirm the view that the toxins of these bacteria must first have time to produce a change in the walls of the blood vessels and destroy the epithelia so as to admit of the free passage of the bacteria through them. This is also rendered probable by the fact that virulent cocci are not eliminated through the kidneys. The author lays stress upon the fact that the pathological changes in the kidneys are not produced by emboli, but that the elimination of the cocci from the blood occurs through the walls of the glomeruli. This elimination would not occur if the toxins produced by the cocci had not first injured the secreting parenchyma.

From the results of these most interesting investigations, the details of which must be looked up in the original paper, it appears possible to explain the often observed fact that nephritic abscesses follow simple cutaneous furuncles, and that in such cases the presence of staphylococci in the urine must become of considerable surgical significance.—*Medical Inspector H. G. Beyer.*

ZUR VERTH, Doctor, marine stabsarzt. Die schnappende Hüfte (Luxatio tractus cristo-femoralis; the snapping hip). Deutsche Zeitschrift f. Chirurgie, Bd. 98, 1909, p. 47.

Under what is generally known by the term "snapping hip," a phenomenon supposed to be more or less pathological in character, Zur Verth discovered the somewhat concealed process of the sudden

slipping of a ligamentous band over the trochanter major. After a careful analysis of a number of cases, the author divides them into two classes, (1) voluntary and (2) habitual. In the former the condition may be produced by an act of volition; in the latter it is involuntary and due to an anatomical defect.

Zur Verth while investigating a number of cases of snapping hip noticed a peculiar and quite considerable thickening in the fascia lata, which on further examination proved to be due to the presence of a special tract in the course of the "tractus ilio-tibialis." On removing, in a cadaver, skin and fat between the hip bone and knee, thus exposing the fascia lata, the tractus ilio-tibialis may easily be discerned. Its strongest fibers come from the crest of the ilium, passing partly over the trochanter major, like the strings of a violin over the stay (Maissiat), partly in front of it, down the side of the leg, to the knee. Anteriorly, it receives fibers from the tensor fasciæ latæ; from the anterior margin of the gluteus maximus muscle. If, now, an incision 4 inches in length and parallel to the femur is made over the trochanter major, through the fascia, and the finger is introduced under this fascia, directed dorsad, the finger is arrested by a band running from the fascia inward and extending from above downward. This band is 4 to 5 mm. in thickness. From behind this band receives fibers from the gluteus maximus, which fibers, when tense, tend to keep the band in a position behind the trochanter. When the leg of the cadaver is raised or abducted about the hip joint this band becomes relaxed; when lowered or adducted, the band becomes tense and jams the finger, unless withdrawn in time to prevent it, between the band and the posterior portion of the trochanter major with great firmness. This alone would be sufficient to show that one of its origins must be skeletal, and, indeed, its fibers can be traced to the crest of the ilium. This strong band, running immediately behind the trochanter major, is the band that slips over the trochanter in the so-called "snapping hip," and has been named by Zur Verth the "tractus cristo-femoralis," in accordance with its anatomical connections.

The function of this band is of considerable importance to the hip joint. While standing, without muscular effort, the point of gravity of the trunk rests behind the hip joint. The ligamentum ilio-femoralis prevents the falling back of the pelvis. The tractus cristo-femoralis is not tense. On standing under muscular effort, the tractus cristo-femoralis is rendered tense, assuming more nearly the function of a tendon of the gluteus maximus muscle. It is different when standing without muscular effort on one leg and with a lowered pelvis on the opposite side of the standing leg. The hip joint, in this condition, is behind the point of gravity of the trunk. Here the tractus cristo-femoralis prevents an inclination of the pelvis

toward the side of the standing leg. The trochanter major acts the part of a hook. Since, however, this hook is far from being very prominent, it requires but a slight relaxation of the gluteus maximus muscle to cause the tract to slip forward over the trochanter, producing the usual sound. The mechanism of its production would seem satisfactorily explained.

The condition was first thought to be due to a dislocation at the hip joint; later it was attributed to a subluxation; now it has been found due to the simple slipping of a ligament over the trochanter major. A correct diagnosis of this phenomenon may become of value in the service, especially with regard to the fitness of recruits or invaliding from the service.—*Medical Inspector H. G. Beyer.*

SPENCER, C. G. (Major, R. A. M. C.). **Three cases of liver abscess treated by aspiration and injection of quinine.** *Journal Royal Army Medical Corps.* January, 1909, p. 71.

All three cases of liver abscess, accompanied by considerable rise in temperature, emaciation, and a high leucocyte count were aspirated and a sterile 1 per cent solution of quinine hydrobromate injected in varying quantity. The operation was done partly under chloroform and partly under local analgesia. In two cases one injection proved sufficient; in the third case three injections were necessary. All three cases made a good recovery. The method followed was that of Rogers and Wilson.

The mortality of the open operation is variously estimated by different observers. Megaw gives it as 60 per cent among natives in Calcutta. Among British troops in India in 1906 and 1907 it was 48 per cent (317 operations, 152 deaths). Sir R. H. Charles, a strong advocate of the open operation, gives the death rate in hospitals as 37.8 per cent and in private practice as 20 per cent. The chief cause of this high mortality is undoubtedly due to infection of the abscess cavity by pyogenic organisms through the open wound and which it is difficult to prevent; the large amount of viscid discharge necessitates frequent changes of dressings, air and pus are sucked in and out of the cavity by respiratory movements, and it is very difficult to keep the skin around the wound aseptic, especially in a hot, moist climate.

Any method of treatment that avoids an open wound into the abscess cavity is, therefore, worthy of trial; and aspiration, with injection of quinine, requires no special apparatus and may be done under local anæsthesia. With an X-ray apparatus present to locate the abscess, the method ought to be practicable on shipboard.—*Medical Inspector H. G. Beyer.*

PATHOLOGY AND BACTERIOLOGY.

Surg. C. S. BUTLER and Passed Asst. Surg. O. J. MINK, U. S. Navy.

DREYER, G. **Widal's reaction with sterilized cultures.** (Translation from "Hospitalidende" No. 19, 1906, Copenhagen.)

Journal of Pathology and Bacteriology, volume 13, Nos. 2 and 3 (Dreyer), January, 1909, gives in this translation what seems to be a real advance in the method of diagnosis of typhoid and typhoid-like conditions by means of dead cultures. The author describes a complicated thermostat which will keep the temperature between 36 and 58° C. for three hours, at which temperature the reaction takes place much more quickly than at room temperature. It would seem that with a covered bucket for water, in which the stand of tubes could be placed, an alcohol lamp, a thermometer, and a boy to watch it for three hours—it could be watched by oneself while about any office work—better results could be expected. The drawbacks in the way of employing dead cultures as usually prepared are spoken of by the author, who shows that cultures prepared as he directs are even more sensitive to agglutination than live cultures and can be applied macroscopically and at the room temperature, though this takes from sixteen to twenty-four hours. This would certainly be of enormous advantage to a physician who had neither microscope nor thermostat. The author's method of getting serum and of making his dilutions seems rather crude. With a Wright's curved tube and a centrifuge, the serum required can be had in five minutes, and with a capillary pipette, graduated in drops with a wax pencil, serial dilutions to any attenuation can be much more rapidly and just as accurately made. The method of preparing the cultures and of applying the test are thus described:

Ordinary meat (veal) peptone bouillon is used as a culture medium. It should be as pale as possible and should not be autoclaved for more than fifteen minutes at 115° C.; otherwise the color deepens and the cultures become more liable to spontaneous agglutination. The less grape sugar there is in the bouillon the better; for numerous experiments have proved that grape sugar lessens the agglutinability of the growths, diminishes the velocity of the reaction, and increases the tendency to spontaneous agglutination.

It is well that any strain of *B. typhosus*, *B. paratyphosus*, or *B. coli* should be passed through a number of bouillon tubes day by day, for several weeks before it is used in the preparation of the culture for agglutination. These passages augment its agglutinability, and result in the production of a more homogeneous strain. After inoculation the flasks of bouillon are kept at 37° C. in the thermostat for twenty-two to twenty-four hours. They are then well shaken up and 0.1 per cent of the ordinary 40 per cent solution of formol is added. After another careful shaking they are placed in the ice chest at about 2° to 6° C. They are well shaken up again that day and also on the following days. If subcultures are made from these flasks from time to time the progress of the sterilization can be watched; growth can always be obtained up to eighteen hours, and sometimes after eighteen to thirty-six hours, but the flasks are

almost always sterilized in forty-eight hours, and invariably so at the end of seventy-two hours, under these conditions. The reason for keeping the flasks at the low temperature of 2° to 6° C. is this, that it hinders the further growth of the bacteria, and so prevents the diminution of the agglutinability that would otherwise follow the increased production of "toxins," etc., in the cultures. The importance of this I have emphasized elsewhere.

Should it happen that the cultures do not form an entirely homogeneous emulsion, they must be filtered through sterilized cotton wool or coarse filter paper (papier chardin). Finally, the cultures so prepared and sterilized, whether of *B. typhosus*, *B. paratyphosus*, or *B. coli*, are put in sterile bottles with rubber corks and kept in the cold and in the dark.

Such preparations have the following advantages:

1. They are absolutely sterile.
2. They are as sensitive to agglutination as the same cultures when fresh, or even more so.
3. They can be kept unchanged for six months or a year, or even longer, so far as my experience goes.
4. They render possible the production of a standardized culture of constant agglutinability. This is a matter of great importance for the introduction of uniformity into the Widal reaction and the collection of extensive results.

For the clinical employment of this method of testing, small test tubes are used and a dropping pipette with an india-rubber bulb. The test tubes are conically pointed at the lower end as Ficker and others have recommended, the edge of their open end being spread out widely to facilitate filling. They are 6 cms. long, 0.66 cm. in diameter; the lip is widened out to 1 cm. The dropping pipette is made on the same lines as an ordinary drop counter. It is 18.8 cms. in length; the end is drawn out to a length of 2.8 cms., with an external diameter of 0.235 cm. and a bore of 0.05 cm. The body of the pipette is 16 cms. long, 0.6 cm. in diameter, and with a bore of 0.34 cm.

While being used the pipette must be held vertically; even pressure is made on the rubber bulb, and the drops issue quite regularly, 25 drops of water or culture circa 0.95 cm. To collect specimens of blood and for diluting the serum, ordinary test tubes (1.1 by 7 cms.) are employed. The agglutination test is carried out in the following manner: A prick is made in the ear or finger, and about 15 drops of blood are collected in a dry sterilized test tube (or sterilized in a flame). The tube is then closed with a plug of cotton wool. In a few hours' time the blood will have coagulated, and enough serum will have collected. If the coagulum does not contract, stir the blood up with a sterile glass rod and centrifugalize (or wait again), when the separation of the serum will invariably occur.

Four drops of this serum are next measured out into another test tube. The pipette is then washed out repeatedly in tap water (boiled or unboiled), 36 drops of water are added to the serum, and the two are carefully mixed, this giving a serum diluted 1 to 10.

Ten of the small sedimentation tubes are put in the stand in two rows of five each. Counting from left to right, water is added in each row as follows: Tube 1, 0 drop of water; tube 2, 5 drops of water; tube 3, 8 drops of water; tube 4, 9 drops of water; tube 5, 10 drops of water.

Next, the serum diluted to 1 to 10 is dropped in from the pipette. Tube 1, 10 drops of 1-in-10 serum; tube 2, 5 drops of 1-in-10 serum; tube 3, 2 drops of 1-in-10 serum; tube 4, 1 drop of 1-in-10 serum; tube 5, 0 drop of 1-in-10 serum.

The pipette is again well washed in water, and to each tube in row 1 is added 15 drops of the prepared sterile *B. typhosus* culture, and to each tube in row 2 is added 15 drops of the similarly prepared sterile *B. paratyphosus* culture. Each tube is shaken thoroughly in order from left to right, and the stand is then placed in the water bath at a temperature between 37° and 55° C. for two hours.

Test tubes 1 to 4 now contain serum in dilutions of one twenty-fifth, one-fiftieth, one one-hundred-and-twenty-fifth, and one two-hundred-and-fiftieth. The fifth tube contains no serum and serves as a control for the detection of spontaneous agglutination. It should never be omitted.

If a measurable amount of agglutinin is contained in the serum, one or more of the tubes will become clarified and less opalescent. A light flocculent deposit will collect at the bottom of such tubes in the course of two to three hours, or even sooner, while the control tube remains diffusedly turbid.

A positive result in tube 1 (serum one twenty-fifth) must be taken as a somewhat doubtful positive reaction. In this case the test must be applied a few days later, as some normal sera give rise to agglutination at this dilution. Well-marked agglutination at a dilution of one-fiftieth or at higher dilutions is nearly always definitely diagnostic of the presence of active typhoid (or paratyphoid) infection.

Since the summer of 1906, the State Serum Institute in Copenhagen has, upon application, supplied hospitals and medical practitioners in all parts of the country, gratuitously, with sterile cultures of *B. typhosus* and *B. paratyphosus* prepared as indicated above.

CONRADI. A new medium for typhoid work. *Münchener Med. Wochenschrift*, July 21, 1908, p. 1523.

In this particular paper Conradi describes a medium for isolating typhoid and paratyphoid bacilli from the stools and for plating after blood cultures, which bids fair to displace other media used for this purpose. During the short time this medium has been in use at the Naval Medical School it has proven extremely satisfactory. The medium consists of agar 30 grams, Liebig's extract 20 grams, peptone 10 grams, water 1,000 c. c. Normal soda or phosphoric-acid solution is added until the reaction become plus 3 with phenol-phthalein as indicator. After sterilizing, 1 c. c. of a 1 to 1,000 aqueous solution of brilliant green crystals, extra pure (Höchst), and 1 c. c. of a 1 per cent solution of picric acid (Grübler) is added to 150 c. c. of the agar. Sterilization is not repeated, since the dyes were precipitated by autoclaving the agar. It will be noted that the medium is very acid and that it contains no salt. The 3 per cent agar makes a good, firm base. Upon plates poured from this medium *B. coli* is greatly restrained while typhoid and paratyphoid are not restrained at all. Typhoid colonies are flat with an irregular border and usually the surface is "gullied." Colon colonies when they grow are more heaped up than are typhoid colonies. In using this medium two or three times as much feces as is used with other plating media should be employed. Conradi has

submitted to exhaustive tests 400 anilin compounds in order to discover a combination which might be least hurtful to the typhoid bacillus and most inhibitory to other organisms. The outcome of his researches has been that a mixture with the agar of a 1 to 15,000 picric acid and 1 to 150,000 brilliant green (which is tetra-ethyl-diamido-triphenyl-carbinol-sulphate) gave the best results. Plates inoculated with typhoid dejecta were incubated at 37° C. for twenty hours. Typhoid colonies might be immediately identified by observing the agglutinating effect of anti-typhoid serum on them. Malachite green media caused a loss of agglutinability of the typhoid bacillus which did not occur with brilliant green. Hence, a bacteriological diagnosis might be made in a day. In 2,850 examinations of feces by this method Conradi isolated the typhoid bacillus 325 and the paratyphoid 35 times, and from 2,500 urine cultures he had recovered the typhoid bacillus on 105 and the paratyphoid on 26 occasions.—(C. S. B.)

STRATHAN, J. C. B. (Maj. R. A. M. C.). Report on a further series of blood cultures from 74 cases of typhoid and paratyphoid fever. Journal R. A. M. C., Dec., 1908.

In the September number of 1908 Journal Royal Army Medical Corps, Major Strathan published a series of 55 cases of typhoid and typhoid-like conditions in which blood-culture methods had been employed. In that series both the broth method of isolation and the Kayser and Conradi method with ox bile were used. The superiority of the bile method over the broth method (50 per cent of successes against 20 per cent) led to the abandonment of the broth method in the present series of cases. In the September paper referred to the author showed that in typhoid-like conditions not only the *B. typhosus*, of typical culture characteristics, but also *B. alcaligenes*, *B. coli*, and *B. paratyphosus* (A and B) have been isolated from the blood. He emphasizes the fact that typhoid-like conditions may be caused by any one of these organisms, and that it is no longer advisable to attribute all these conditions to the *B. of Eberth*. In the present paper he emphasizes the importance of blood cultures and shows that even with as small quantities of blood as 0.5 c. c. it is the rule to get positive results in the early days of typhoid fever. As agglutinins begin to appear in the serum, the successful results with blood cultures fall off.

His conclusions are as follows:

The results obtained in this series of 74 cases tend to show that even when such small amounts of blood as 1 c. c. are used for purposes of culture, positive results can be obtained in over 90 per cent of cases of typhoid of medium severity if the culture is taken within ten days of the onset of the disease.

As 1 c. c. of blood can readily be obtained from a finger pulp, and further, as the use of bile as a culture medium is simple and easy of application, this method of culture should be one of great value for the early diagnosis of typhoid fever.

In those cases of typhoid where cultures by this method failed, a positive agglutination reaction could usually be obtained by testing the patient's blood serum. It follows from this that by carrying out a blood culture and a serum test in each instance, few cases of typhoid fever would escape diagnosis within twenty-four hours.—(C. S. B.)

MILNE, L. S. (M. R. C. P. E.) **The histology of liver tissue regeneration.** *Journal of Pathology and Bacteriology*, January, 1909.

The author draws the following conclusions from his work on this subject:

1. The liver is capable of a great degree of regeneration when a sufficient reduction in the volume of its parenchyma has taken place.
2. This is chiefly compensatory and follows disease or experimental lesions in which there has been extensive liver cell destruction.
3. The liver cells proliferate directly with no transitional type of cell.
4. The cells of the outer half of the lobule show the greatest regenerative capacity.
5. The multiplication is usually by direct division of the cells, though occasionally by karyomitosis.
6. Cirrhosis of the liver depends on a primary necrosis of tracts of liver cells, these areas being later replaced by connective tissue from the adjacent portal spaces. The destruction of a definite ring of liver cells at the periphery of the lobule causes a monolobular cirrhosis. Ordinary atrophic cirrhosis is the result of repeated damage to the liver parenchyma, a replacing of the necrotic defect by connective tissue, and, finally, a compensatory liver cell hyperplasia.
7. The replacing fibrous tissue shows numerous "bile duct like" structures. These often show connection with the old interlobular bile ducts or the liver cell trabecula. The lining epithelium varies in character, but never produces cells resembling liver cells.
8. Liver cells always regenerate from preexisting liver cells.—(O. J. M.)

KOCH, DR. JOSEF. **Typhoid bacilli and gallbladder.** CHIAROLANZA, DR. RAFFAELE. **Experimental investigation of the relations between the bacilli of typhoid and the gallbladder and bile passages.** (From the Royal Institute for Infectious Diseases in Berlin, Director Prof. Dr. Gaffky) *Zeitschr. f. Hygiene u. Infektionskrankheiten*. Bd. 62, 1908, pp. 1 and 11.

The bacilli of typhoid may get into the gallbladder (1) from the intestine by ascending the duct choledochus and the duct cysticus; (2) from the circulation through the capillaries in the liver, whence the bacilli may wander into the bile and into the gallbladder by way of the duct hepaticus; or (3) they may come from the capillaries of the gallbladder itself and thus directly infect its contents. Up to a few years ago the generally accepted theory was that the bacilli made their way from the intestine into the gallbladder by virtue of their

own motility. To-day, however, the theory is that the bacilli leave the capillaries in the liver, pass into the bile, and thence are swept into the gallbladder, where, after increasing in number, they invade the wall of the bladder, giving rise to inflammation, and finally make their way into and infect the intestinal canal.

Based upon considerable experience and a large number of observations on cases of typhoid fever and of bacillus carriers, Frosch had become almost convinced that the gallbladder could not be considered as the sole seat of the bacilli in bacillus carriers, but that the bile passages—indeed, even the liver itself—must have a share in it. Koch at the suggestion of Frosch, then took up the study of the pathological histology of the gallbladder and the changes it underwent during typhoid infection. The material was obtained from a case of typhoid fever that had died during the third week of the disease on account of heart failure.

He found that the most striking features of transverse sections of the gallbladder consisted in the great abundance of papillary processes reaching out into the lumen of the bladder like the arms of a polyp. These fringelike processes were found to start from a connective tissue, very rich in cells, in the submucosa of the bladder. An abundant cellular infiltration was also noted in all the tissues of the different layers forming the wall of the bladder. The vessels of the submucosa were found to be choked with blood corpuscles. The epithelial layer of cells of the mucous membrane of the gallbladder had entirely disappeared. Within the processes mentioned small nests of bacilli were plainly seen, and around these bacillar nests the tissue cells had lost their nuclei, and thus a narrow necrotic zone had developed, extending in many cases through the entire thickness of the papillary wall. Through the final death of these tissues the contents of these nests of bacilli must fall into the lumen of the bladder.

In order to prove experimentally and to decide whether it is through these nests that the gallbladder is infected, or whether it is through the bile passages from the liver, a series of experiments on animals was made, in which the cystic duct was ligated and typhoid bacilli injected intravenously. In all the nine experiments cultures of typhoid bacilli were obtained from the contents of the gallbladder. These experiments would prove that the primary infection of the gallbladder occurs from the capillaries of its own walls.

Basing their arguments upon the study of the histological appearances as well as upon the experimental results obtained by Chiarolanza, the authors have become convinced that typhoid bacilli get into the gall bladder from the blood of the capillaries in its own walls and after having caused chronic inflammatory changes and

alterations in the tissues of the walls of that organ. The accumulations of bacilli, forming bacillar nests, arise here in exactly the same manner as they do, for instance, in the spleen, mesenteric gland, kidneys, etc., that is to say, the bacilli leave the blood capillaries, forming peculiar little nests in the surrounding tissues in which the toxins give rise to a zone of necrotic tissue, ending in its final destruction and the setting free of the bacilli.

The experimental results obtained by Chiarolanza, besides confirming the histological findings in man, have, moreover, shown that the gall bladder is by no means the only organ in which a chronic inflammation was caused by the bacilli, but that the bile passages, the duct, cysticus, and choledochus, as well as the biliary passages of the liver itself, are included in this process.

If further studies will show that similar conditions exist in chronic bacillus carriers, they would easily explain the chronicity of these cases and the prolonged existence of infectious bacilli within them. The chances for a final definite cure of such cases is, at the same time, rendered very much more hopeless. All the greater, however, has become the importance from a hygienic and prophylactic point of view that these patients are taken proper care of.—*Medical Inspector H. G. Beyer.*

McINTOSH, JAMES, M. D. (Carnegie Research Fellow). **The occurrence and distribution of the *spirochæta pallida* in congenital syphilis.** (Extract from thesis.) *The Journal of Pathology and Bacteriology*, Cambridge, Vol. XIII, January, 1909, p. 239.

By means of the later modifications of the silver methods, especially Levaditi's original process, McIntosh was able to demonstrate the *Spirochæta pallida* in most of the lesions of congenital syphilis, even inside the ovum in the Graafian follicle of the infant. This discovery may lead those authorities who have always objected to the term hereditary syphilis to admit the possibility of infection through the ovum, as after this demonstration of the spirochæta inside the ovum in the infant it does not require great imagination to conceive a similar occurrence in an adult syphilized woman. The objection raised to this is that such infection must lead to the destruction of the ovum. This, however, does not occur in the case of the tick (*Ornithodoros moubata*) which spreads tick fever; why should it occur here?

The material examined consisted in some 12 cases of suspected congenital syphilis, definite lesions being found in 5 of them, in 4 of which the spirochæta was found. The fifth showed a liver with marked signs of congenital syphilis, though there was no suspicion of parental infection; the other 4 pointed to maternal infection.

For diagnostic purposes Giemsa's solution or Löffler's cilia stain is the best method for smears. Fragments of the organ were cut into pieces about 1 mm. in thickness, fixed in formalin and stained in bulk by the silver nitrate process. For histological studies, sections of the various organs were stained by the usual stains, such as hæmatoxylin and eosin, or by Van Gieson's method. After this manner, the lungs, livers, spleens, suprarenal glands, kidneys, placenta, and cord and skin were studied.

The large number of spirochætæ found in the liver causes the author to suspect the infection to be maternal and of its having occurred through the placenta. The opinion now generally held is that the spirochætæ are carried in the blood of the liver of the fœtus, where they multiply and are then carried by the blood stream through the whole body.

The *spirochæta pallida* has a special affinity for structures of the nature of connective tissue or glandular epithelium. The organs in which the spirochæta is most frequently found in congenital syphilis, are the liver, lungs, spleen, suprarenal, and skin lesions of the nature of pemphigus. The number is usually largest in the liver, the organ which first receives the blood after it has passed through the placenta.

The *spirochæta pallida* is evidently very susceptible to the process of maceration, for after but slight maceration no spirochætæ can be found in the lesions, even after diligent search. Evidently the process of maceration or catalysis destroys the spirochætæ.

The author concludes that in 70 per cent of definite syphilitic lesions the presence of the spirochæta can be demonstrated and that it therefore must play an important part in the causation of these lesions.—*Medical Inspector H. G. Beyer.*

de BESCHE, Dr. A., and KON, Dr. (Foromsa). **Experiments on the differentiation of cholera and cholera-like vibrios by complement fixation.** Zeitschrift f. Hygiene u. Infektionskr. Bd. 62, Heft, 2, p. 161, 1909.

The questions which the authors proposed to investigate were: Can cholera-like strains and the El Tor strains be distinguished from genuine cholera, and is it possible to simplify the process so that the method of complement fixation may be used in the diagnosis?

Vibrio extract was obtained in the following way: The eighteen hours' surface culture of cholera, grown in a Kolle dish, is taken up with 15 c. c. of distilled water and kept for one hour at 60° C., and then shaken at room temperature for twenty-four hours. After centrifugalizing a short time the slightly turbid fluid may be used. The experiments on complement-fixation were made as follows: First, the extract, serum, and complement were mixed, the mixture

allowed to stand at 37° C. in the incubator, whereupon the mixture of Hæmolysin and suspended blood corpuscles was added to it. The whole was placed for two hours at 37° C. in the incubator, and then for eighteen hours in the ice box, and the result noted. The hæmolytic system employed was the following:

1. Guinea-pig serum, diluted 1:10 (complement).
2. Blood serum from a rabbit treated with sheep's corpuscles, diluted 1:300 (hæmolysin).
3. A 5 per cent suspension of sheep's erythrocytes.

In the first series of observations it was shown that cholera extract and cholera serum possessed the property to fix complement, and, furthermore, that one and the same serum gave positive results with different cholera-vibrios.

In a second and third series of experiments it was shown that cholera serum with extracts of cholera-like vibrios gave no complement fixation, nor was a positive result obtained with cholera-extract and cholera-like vibrio-serum. On the other hand, complement fixation was obtained between extract and serum obtained from cholera-like vibrios, while no inhibition of complement fixation could be obtained by mixing vibrio-extract with a heterologous vibrio-serum.

The results obtained had clearly demonstrated the fact that it was possible, by means of the method of complement fixation, to differentiate the true cholera vibrios from the cholera-like vibrios.

Further experiments showed that no difference could be obtained by the complement fixation method as existing between cholera and the "El Tor" strain.

Further observation showed, moreover, that a simple suspension of bacteria gave just as positive a fixation of complement as did the extracts, so that a result by this method may be obtained after three to four hours. This abbreviated method also showed the identity between the true cholera vibrio and the "El Tor" strain.—*Medical Inspector H. G. Beyer.*

MEDICAL ZOOLOGY.

Surg. R. C. HOLCOMB, U. S. Navy.

SAMBON, L. W. (M. D., F. Z. S.). What is "*Schistosomum Mansoni*" Sambon 1907? *Journal of Tropical Medicine and Hygiene*, vol. 12, No. 1, January 1, 1909, p. 1.

This article is an answer to the criticism of Professor Looss. Sambon contends that he has ample proof of the existence of the *Schistosomum mansoni* as a distinct species from the *Schistosomum hematobium*. Sambon contends that the *Schistosomum mansoni* by a number of observers has been shown to seek the intestinal tract of its host in preference to the genito-urinary tract, which seems to be

selected by the *Schistosomum hematobium*. He contends that the lateral spined egg is not an occasional production of a female producing normally a terminal spined egg, and classes a worm capable of producing the two kinds of eggs with the phoenix, the chimæra, and other mythical monsters. He scouts Looss's theory that the egg is the production of immature females or unfertilized females, as Looss has himself described two females both in the gynæcophoric canal of males in the hæmorrhoidal vein about 7 cm. distant from the anus. As to the geographical distribution, Sambon refers to the reports of Low and Castellani from Uganda and Holcomb and Ashford from the West Indies to show that in these localities the *Schistosomum mansoni* is found almost exclusively.—(R. C. H.)

TURNER, G. A. Pulmonary Bilharziosis. The Journal of Tropical Medicine and Hygiene, February 1, 1909, p. 35.

Doctor Turner, reporting from South Africa, mentions the comparative frequency of the ova of the *Schistosomum hematobium* in the tissues of the lungs of native patients dying of respiratory disease.

In 25 native patients dying of respiratory diseases he found 16, or 64 per cent, had the terminal spined ova in the tissues of their lungs.

Of 15 other native patients dying of other disease than disease of the respiratory organs he found the ova in 5, or 33.3 per cent.

He believes that it is quite possible that a large number of patients harbor the ova of the parasite in the tissues of their lungs, and that they are more susceptible to other lung complaints when attacked, and the consequences are more apt to be fatal.

Most of the ova he found were calcified, and he believes this to be the reason that eggs were never found upon examination of the sputum.—(R. C. H.)

PHALEN, J. M. (captain, U. S. A. Medical Corps), and NICHOLS, HENRY T. (first lieutenant, U. S. A. Medical Corps). Filariasis and Elephantiasis in Southern Luzon. The Philippine Journal of Science, September, 1908, p. 293.

These authors discuss under the above title their experience with elephantiasis and filariasis as found in Sorsogon Province, southern Luzon. Thirty-four cases of the disease were observed. Of this number, 19 were males and 15 females. The examination of the blood in these patients showed the presence of filarial embryos in but 3 instances.

A number of examinations was also made of the native population. Of a total of 80 examined, filarial embryos were found in the blood of 11. Of 37 prisoners in the provincial jail, 9 showed the presence of microfilaria in blood specimens taken at 10 o'clock. Out of 93 members of Thirty-second Company, Philippine scouts, recruited from

Bico Provinces, 9 were found infected. These authors note that of 9 cases of filariasis previously reported in the Philippine Islands 7 were natives of the Bico Provinces. It is their opinion that the microfilaria found in the cases reported in their article are the *Microfilaria bancrofti*, more commonly known as the *Filaria nocturna*, and that this is the common filaria of the islands.

They are inclined to see a relationship between the *Microfilaria bancrofti* and elephantoid disease.—(R. C. H.)

STRONG, R. P. The diagnosis of African tick fever from the examination of the blood. Archiv für Schiffs- und Tropen-Hygiene, Bd. 13, Heft. 1 and 2, 1909.

Strong discusses the subject of the difficulty frequently encountered in making a diagnosis of the African variety of relapsing fever by means of fresh blood films. He quotes numerous authorities to show that the spirochæta might be very rare in the blood of a well-developed case, it sometimes being necessary to spend several hours before finding a single organism. He mentions one instance where, in 1 case out of 8 of tick fever which were studied, only 1 parasite was found in every 30 fields.

Because of the difficulty to demonstrate the spirochæta in the blood, Strong began the study of serum for diagnostic purposes in cases of relapsing fever. In the course of his work he came to the conclusion that agglutination was too inconstant to be of any use, as agglutination would not only take place in normal serum, but the spirochætæ would also undergo the apparent process in their own serum without the addition of the blood to be tested.

He then began the precipitin reaction. His experiments were conducted with two strains of spirochætæ, one obtained from Africa and one obtained from America. The test was carried on by superimposing one serum upon the other, the second serum being allowed to flow down the side of the reagent glass from a capillary pipette until a layer of equal thickness to that of the first below had been introduced. As a result of four series of experiments with rats he came to the conclusion that the precipitin reaction in the manner employed by him is of no value for the purpose of either differentiation of the spirochætæ of relapsing fever or the diagnosis of the infection. He finds that there is some evidence to show that during immunization with these spirochæta agglutinins and bacteriolysins become developed in demonstratable quantities more quickly than precipitins.

The agglutinative test does not constitute a satisfactory means of diagnosis, owing to the difficulties of technique of performing the reaction and the fact that in tick-fever infections the agglutinins sometimes do not become developed until after several relapses or re-infections.

He concludes that for the present the most efficacious methods at our disposal are the microscopic examination of peripheral blood and that obtained by puncture of the liver and spleen, both in fresh and in stained preparations, and by animal inoculations when suitable species are at hand for this purpose.—(R. C. H.)

PATTON, W. S. The parasite of kala azar and allied organisms. *Lancet*, Lond., January 30, 1909, p. 305.

In this paper Patton seeks to show that the parasite of kala azar, as well as the parasite of infantile splenomegaly and oriental sore belongs properly in the genus *Herpetomonas*. He does not agree with Laveran and Mesnil to place it in the genus *Piroplasma*, as Christophers's recent studies on the extra corporal life cycle of the *Piroplasma canis* in the tick have shown that the latter does not pass through a flagellate stage similar to that of the parasite of kala azar. He further believes that the new genus *Leishmania*, in which the parasite was placed by Ross, is in error, as the parasite according to his studies is too closely related to the genus *Herpetomonas*. In Patton's studies of the *Herpetomonas muscae domestica*, which he found to be harbored by 100 per cent of the flies captured in the bazaar of meat shops in Madras, this parasite was found to occupy, in its life cycle, three stages of development; these three stages he divides into a pre-flagellate stage, a flagellate stage, and a post-flagellate stage.

The pre-flagellate stage is usually found in the midgut. The parasites are round or slightly oval bodies about 5.5 microns in breadth, and contain a nucleus, blepharoplast, and a number of granules. They multiply by simple longitudinal fission or by multiple segmentation. The flagellate stage is characterized by the formation of a single stout filament which projects freely from a point in close proximity to the blepharoplast, the resulting flagellate elongates and later divides by simple longitudinal division.

The nucleus of an adult flagellate lies about the center; the blepharoplast, a large rod-shaped body, is nearly always situated a short distance from the anterior end; the flagellum, a single filament, which projects freely almost at once from the rounded anterior end. The early stage of longitudinal fission begins by a splitting of the root of the flagellum and this, as well as further stages of the same change, led Prowazek to believe that the *Herpetomonas muscae domesticae* has a double flagellum.

The post-flagellate stage may be seen if the midguts of a number of flies are examined. In some the flagellates will be seen collecting together toward the rectum; they attach themselves in rows by their

flagella ends to the gut wall. The most external parasites begin to shorten, and while this change is taking place the flagellum degenerates and is eventually shed. A palisade of parasites is now formed, the most internal showing the changes noted above, while the most external are seen as round bodies devoid of flagella, and many of the latter forms are seen dividing again. Eventually all bodies round up and are connected together by a sticky substance, and these masses of cells constitute the cysts. These cysts are passed out in the feces of the fly en masse and are well adapted to resist desiccation. It is these bodies which are again sucked up by the flies as they feed.

Patton also describes and illustrates the life cycle of another herpetomonad, *Herpetomonas lygæi*, which is even more identical with the parasite of kala azar. The development of the parasite of kala azar he has described in another article (see review, p. 183, vol. 1, U. S. Naval Medical Bulletin) on the bedbug (*Cimex rotundatus*).

All three herpetomonads undergo their developmental stages in the intestinal tracts of insects.

Patton suggests for the parasite of kala azar the name *Herpetomonas donovani* (Laveran and Mesnil); the parasite of infantile splenomegaly, as *Herpetomonas infantum* (Nicholle); and the parasite of oriental sore, *Herpetomonas tropica* (Wright).

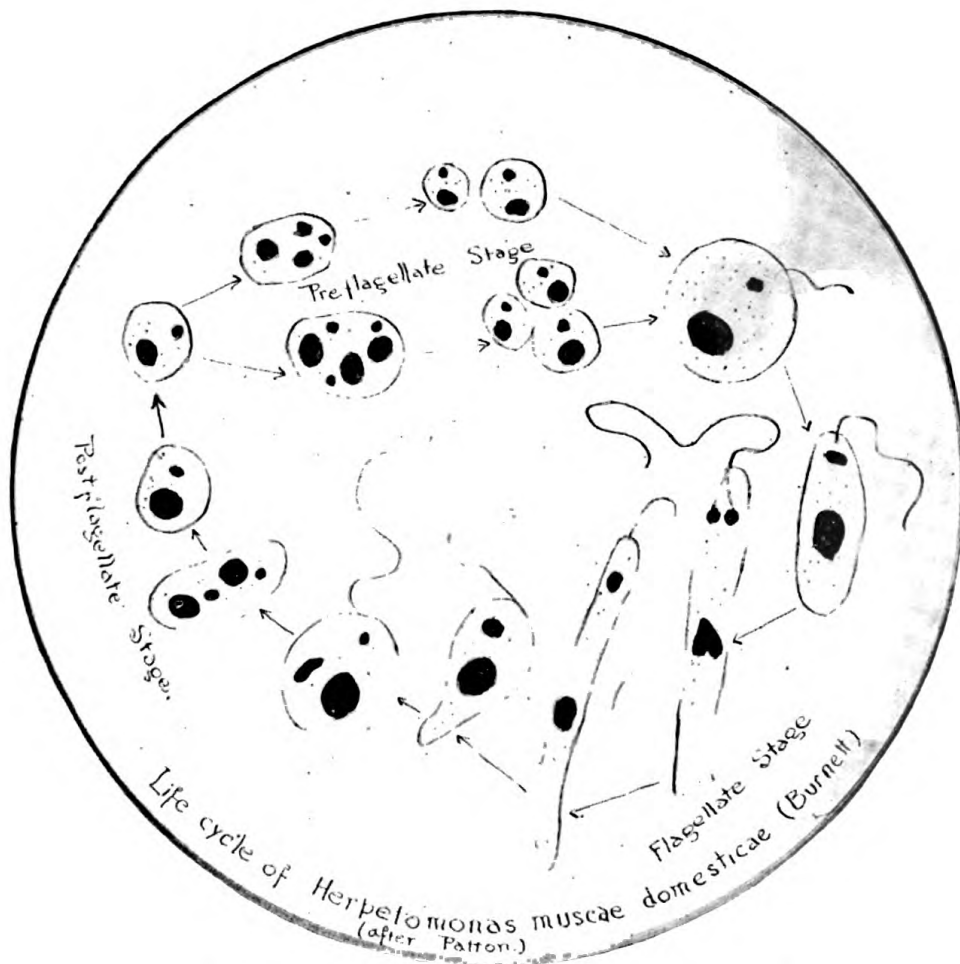
He further suggests that the diseases produced by these parasites should be collectively known as *Herpetomoniasis*.—(R. C. H.)

STEPHENS, J. W. W. A new human nematode *Strongylus gibsoni*. *Annals of Tropical Medicine and Parasitology*, vol. 2, No. 4, February 3, 1909, p. 315.

Stephens describes a new nematode found in the feces of a Chinaman employed at the slaughterhouse, Hongkong. There were 10 males and 9 females. The males measured 21 mm. long and 0.4 mm. thick toward the middle. Two lateral papillæ occur, one on either side of the buccal orifice. About 4.5 mm. behind the head are situated two cervical papillæ. The female is about 25 mm. long. The tail is pointed and in some specimens somewhat curved.

The anus is situated 0.2 mm. and the uterine opening 0.5 mm. from the tip. The eggs in utero measure 110 by 53 microns.

In the male the bursa visible to the naked eye is a bilateral appendage. Each lobe is a concave-convex lanceolate expansion, the tip of one folding over the other. The distance from the base of the bursa to the tip of the fold and curved lobes is about 1 mm. The spicules are extremely long and delicate, being about 7 mm. in length, or one-third of the length of the body.—(R. C. H.)



THE PARASITE OF KALA AZAR AND ALLIED ORGANISMS.

GUTIERREZ IGARAVIDEZ, P.; GONZALEZ MARTINEZ, I.; SEIN SEIN, F. Report of the permanent commission for the suppression of uncinariasis.

The total number of patients treated during the year amounted to 81,375; 41,120 were male and 39,734 female. The young, as in the last report, continued to show the largest percentage affected; 64.65 per cent were between the ages of 10 and 30.

As a result of their treatment 25,757 were entirely freed of uncinariæ.

With this year, on account of the failure of the legislature to appropriate, the labors of the commission come to an end. What they have been able to do is perhaps no better shown than by the records of the honorable superintendent of health, which show a drop in the deaths from anæmia from 11,875 in 1900-1901 to 1,785 in 1907-8.—(R. C. H.)

STEPHENS, J. W. W. On the supposed occurrence of the *Filaria immitis* in man. Annals of Tropical Medicine and Parasitology, February 3, 1909, p. 317.

Stephens shows that the *Filaria immitis* said to have been found in man by Bowlby is an error, due to accidental or erroneous use of the name *Filaria immitis* by a reviewer, who reviewed a paper by Bowlby on two cases of Bilharziasis. Mr. Bowlby disposes of this reference by denying that he ever discovered this parasite in man. With reference to the cases reported by Braun as having been found in the veins of a Russian from Dorpat in 1885, Braun distinctly states that the worms were not identified; Stephens therefore believes that we are not justified at present in including *F. immitis* among the parasites of man.—(R. C. H.)

TROPICAL MEDICINE.

Surg. E. R. STITT, U. S. Navy.

FRASER, DR. H., and STANTON, DR. A. T. An inquiry concerning the etiology of beriberi. The Lancet, February 13, 1909.

The authors refer to the work of Vorderman in 1895, who showed that when prisoners were fed on red rice the incidence of beriberi was 0.01 per 1,000, while those fed on a mixed diet of red and white rice afforded 2.4 cases per 1,000, and those on a white rice diet 28 per 1,000. With white rice, the spermoderm and perisperm are almost entirely removed, while in red rice they remain in great part. They refer to Braddon's designations of "cured," "uncured," and "fresh" rice, respectively, but prefer to employ the term "parboiled" for the term "cured," and "white rice" for the "uncured rice" of Braddon.

The parboiled rice is steamed before being milled, while with the white rice no preliminary treatment is undergone prior to milling.

The former is of a yellowish color and is almost exclusively used by the Tamils, who afford a very insignificant proportion of the cases of beriberi. All other classes of laborers prefer white rice.

To test the rice theory they experimented with 493 Javanese coolies who were employed in building a road far removed from any village which might introduce the factor of bacterial etiology into the problem. It is noted that the Javanese prefer white rice, and reference is made to the fact that many cases of beriberi occurred among these laborers in 1906, which outbreak ceased upon requiring them to eat parboiled rice (at the suggestion of Doctor Braddon).

The authors state that they informed the coolies of the dangers of white rice, but, notwithstanding, they all expressed a preference for this over parboiled rice. For the purpose of comparison, only one-half were allowed the white-rice diet. The two parties were quartered in virgin jungle, and were isolated from each other by an interval of 7 miles. Of 220 individuals on white rice there were 20 cases of beriberi recorded, while among 273 who lived on parboiled rice no cases occurred.

It appeared that a considerable period of continuance of the white-rice diet was necessary before the appearance of the disease (eighty-seven days).

As against the infectious nature of the disease they note that contact of persons on a parboiled-rice diet in the beriberi cases was without result.

Substitution of parboiled rice for white rice brought about a cessation of an outbreak. Blood examinations were entirely negative.

The authors consider that the results of the experiment indicate an intimate relationship between the consumption of white rice and the incidence of beriberi.—(E. R. S.)

BRUCE, Sir DAVID (colonel, C. N., F. R. S.), and BATEMAN, H. R. (captain, Royal Army Medical Corps). *Have trypanosomes an ultramicroscopical stage in their life history?* Journal of the Army Medical Corps. Reprinted from Proceedings of the Royal Society, B., vol. 80.

By an ultramicroscopical stage in the development of a micro-organism is meant a stage in which the parasites are so small as to be invisible to the highest powers of the microscope and to be capable of passing through the pores of a porcelain filter. For example, a drop of South African horse-sickness blood will give rise to the disease if injected under the skin of a healthy horse. If a similar drop is examined under the highest available powers of the microscope, nothing in the shape of a micro-organism can be seen. If this blood is filtered through a porcelain filter, the virus passes through and the

filtrate is found to be as infective as the original blood. Horse sickness is therefore looked upon as a disease caused by an ultramicroscopical micro-organism.

For some time it has been reported by various workers that an ultramicroscopical stage exists among trypanosomes. For example, Plimmer informs us that he found the filtered blood of nagana animals to be infective. Salvin Moore and Breinl write that the blood of animals suffering from *Trypanosoma gambiense* infection, although apparently containing no trypanosomes at all, and even if properly filtered, is still capable of infecting other animals into which it may be introduced. MacNeal also makes a similar statement in regard to *T. lewisi*. He states that "in cultures on blood agar *T. lewisi* may give rise to much smaller forms, and that such cultures, after passage through a Berkefeld filter, still infect rats." Finally, it may be noted that the late Dr. Fritz Schaudinn expressed the belief "that trypanosomes may multiply by longitudinal division so rapidly as to become small enough to pass readily through a Chamberland filter."

The authors made a series of careful experiments to test the truth of the statement that trypanosomes have this invisible stage. The filters used were Berkefeld's ordinary filters for laboratory use. These were tested before use and found to readily keep back *Micrococcus melitensis* from the filtrate. The apparatus was attached to a Sprengel's pump.

From their experiments the authors conclude that cultures of *T. lewisi* on blood agar do not give rise to ultramicroscopical forms which are capable of passing through a Berkefeld filter; that neither *T. brucei* nor *evansi* develops, in the body of an animal, forms so small as to be capable of passing through the pores of a Berkefeld filter, and that in cultures of *T. lewisi* on blood agar such small forms are also absent.—*Medical Inspector H. G. Beyer.*

MASUCCI, DOTT. A. Atoxyl as a curative agent in malaria. (From the naval hospital at Taranto). Ann. di medicina navale e col., Vol. II, fasc. IV, October, 1908, p. 477.

The author gives the histories of 13 cases of malaria with their temperature curves as affected by hypodermic injections of atoxyl on the one hand and quinine on the other. While in one or two cases out of the 13 a slight effect is produced by atoxyl, this is either very feeble or, when it produces a notable effect on the curve, it is only temporary. It seemed to the author as if atoxyl had the effect of temporarily decreasing the virulence of the parasites, which after a while resumed their work with an increased violence.

In the judgment of the author, the action of atoxyl in cases of acute malaria is weak and uncertain in some cases and entirely neg-

ative in the majority of cases. Until the contrary will be shown in a larger number of cases, the author will continue to believe that the new remedy does not equal in value quinine, which still remains the most potent poison for the parasites of malaria. Atoxyl may perhaps be of use in cases in which an arsenical compound will influence a cachexia; it has but little effect on the parasites themselves.—*Medical Inspector H. G. Beyer.*

GENERAL MEDICINE.

By Surg. R. M. KENNEDY, U. S. Navy.

BUCHANAN, G. B., M. D. The treatment of acute inflammatory conditions by Bier's hyperæmia. *The Lancet*, November, 1908.

Without unnecessary details the general lines of the treatment which Buchanan describes are as follows: As soon as an acute inflammatory condition has declared itself in a limb or other accessible place passive congestion is induced either by means of an elastic bandage or by a large cupping glass, which is partially exhausted with an air pump. In the most acute cases the congestion is kept up for a long time—twenty-two hours out of the twenty-four—so that the tissues become bathed and infiltrated with the juices of the blood, which exert an antagonistic action on the offending germs, and also afford abundant nourishment and so avert necrosis. In the intervals the limb is elevated in order to allow the œdematous swelling to subside and a fresh flow of blood to wash through it and to carry off the effete and poisonous material pent up, after which the hyperæmia is again induced. As the inflammation subsides the periods of congestion are shortened. The important requirements in the application of the band are to adjust it so that the venous outflow is retarded but not stopped; that the arterial circulation is obstructed as little as possible, as evidenced by the warmth and color of the limb; and otherwise that the tissues are not injured nor the patient put to any pain. For the upper limb a bandage of pure rubber is used, similar to "Martin's bandage," but considerably thinner and weaker and incidentally much cheaper. It is applied in three or four turns round the arm, well above the seat of inflammation. To prevent irritation of the skin, the site of the bandage should be altered a little each time, and if there is any irritability a thin layer of gauze is spread beneath it. As an ordinary band can not be applied for inflammation at the shoulder, a piece of rather soft rubber tubing is fastened loosely round it to form a ring, the ends being fixed with a clamp, and this ring is drawn close by means of straps across the chest. Owing to the narrow area of pressure, such a band must be frequently loosened to prevent chafing. Attempts to use a similar ring for the hip were

disappointing. In the lower limb the stout "Martin's bandage," or even strong elastic woven bands are requisite. The disadvantages of the thicker fabrics, however, are the unyielding hardness of a series of overlapping turns, which is apt to cause pain. Bier, in his book, enters fully into the need for obtaining the correct degree of hyperæmia, but a little practice is required before the bandages can be applied always at the proper tension, and this is more particularly so in the limb. As a rule, however, the proper tightness can soon be found and hyperæmia induced without difficulty.

The other method of producing passive hyperæmia is by cupping glasses of various sizes and shapes as developed by Bier and Klapp for different uses. The action is twofold; first, they produce local congestion by drawing the tissues into the partial vacuum created, and causing them to expand; and, secondly, they remove the discharge by the suction, a very valuable help in draining deep wounds and sinuses. The former of these actions is comparable to that of the bandage, and a great advantage is derived from the applicability of cups to many parts of the body where a bandage can not be used and where this treatment could not otherwise be made available.

To help the cups to adhere, the skin is shaved of all stiff hairs and smeared thickly with vaseline, which further prevents the surface from being infected with the discharge from the incision or sinus, if there is any. Where this anointing was inadvertently omitted in two cases a crop of pustules appeared, but the repeated action of the cupping glasses seemed to prevent them from developing to any extent. The edges, of course, must be examined, to insure that they are not chipped. The cups are exhausted only enough to make them adhere firmly without causing pain, any further suction being injurious rather than beneficial. It is essential that each case, if not treated entirely by the medical man himself, should be constantly supervised, and that the person intrusted with the carrying out of the method should be instructed and shown how to do so. In all cases the medical attendant should apply the cup himself the first time or two, in order to test by means of the local reaction, and also the feelings of the patient, the degree of vacuum required.

Bier's other means of treatment, by active hyperæmia as produced by hot-air baths, is not applicable to acute inflammatory diseases.

In the German Surgical Congress of 1906 a general survey was taken of the results. Among other speakers Lexer was inclined to restrict the application of hyperæmia without incision to the slighter forms of inflammation only; otherwise it was too risky. He thought also that the duration of the disease was not shortened, and that therefore it was necessary to be on the watch for complications

arising in the course of the ailment. Most of the other surgeons agreed that erysipelas and other streptococcic infections were not suitable for the treatment, on account of their tendency to spread beyond the band, and that diabetes and varicose and thrombotic conditions of the veins were contra indications, although cases of all these were reported as being successfully treated. On the other hand, there was almost unanimity with regard to the beneficial effects on tenosynovitis, cellulitis, and joint infections, while milder cases of osteomyelitis were greatly improved and aborted.

Bier himself reported further excellent results with osteomyelitis, but admitted that his best ones were obtained in the slighter forms which had recovered in many instances without necrosis of bone. He has decided of late that pain during the constriction by a band is not always a contra indication, as he had successful results in spite of it. It is said to have been observed that time after time cases which did not seem to be improving under the hyperæmia treatment, and in consequence of which the band had been given up, have, after a while, shown a sudden healing tendency, difficult to define but quite appreciable, as if some alteration in the character of the disease had been produced by the former treatment.

In conclusion the author says it may be admitted, without making extravagant claims for this method, that we have a valuable adjunct to other surgical treatment both for the prevention and the cure of inflammatory diseases.

MILLER, R. T., M. D. **Treatment of tetanus with subarachnoid injections of magnesium sulphate.** American Journal of Medical Sciences, December, 1908.

The author discusses this subject in extenso, and states there are 14 cases on record treated with magnesium sulphate. Of 11 cases treated by subarachnoid injections, 5 have recovered—a mortality of 55 per cent. This result is believed to be encouraging, inasmuch as almost all the cases in this series were of that type of tetanus which usually proves fatal.

In concluding his paper, Miller assures us that by the use of magnesium sulphate it is possible to achieve complete muscular relaxation in almost all cases of tetanus; from the report of results there seems to be a distinct benefit to the patient in this condition, inasmuch as it prevents the rapid exhaustion due to convulsions, and in most instances has made it possible for the patient to take nourishment. While as yet there is comparatively little clinical evidence upon which to base a general statement, it seems possible to avoid the dangerous effects of an overdose of magnesium salts, and it is

likely that when the technique has been worked out thoroughly the treatment will offer a possibility of saving a great many patients with tetanus who at the present time are given up as hopeless at first sight.

MCKENZIE, IVY. M. B. (Carnegie Research Fellow). **The serum diagnosis of syphilis.** *The Journal of Pathology and Bacteriology*, Vol. XIII, Nos. 2 and 3, January, 1909, p. 311.

In an address to the Congress for Clinical Medicine, in Vienna, in April, 1908, Wassermann reviewed the statistics relative to cases examined by the complement deviation method, so far as he could obtain them up to date. From charts he demonstrated that 1,982 cases of syphilis had been examined, and, alongside of these, 1,010 controls—that is, cases in which, as far as could be judged, syphilis had never been present. From the controls there was not a single case in which the complement deviation method had given a positive result. Of all the cases of syphilis presenting manifest symptoms of the disease 90 per cent gave a positive reaction; of the cases of latent syphilis—that is, such as gave a history of syphilis but at the time of examination showed no signs—50 per cent gave a positive reaction.

In the present communication the author confines himself to the results of experiments carried out by the complement-deviation method, first suggested by Wassermann, Neisser, and Bruck. The details of the technique employed are as follows:

I. The hæmolytic system used was one obtained by the treatment of a 5 per cent suspension of ox red blood corpuscles with hæmolytic immune body from the serum of a rabbit treated with ox corpuscles, guinea pig serum being used as a complement. The corpuscular suspension was treated with five times the minimum hæmolytic dose of immune body.

II. As antigen, watery and alcoholic extracts of various organs were employed; in the preparation of the extracts one part of the chopped and pounded organ was put in four parts of normal saline with a one-half per cent carbolic acid, or in 96 per cent alcohol, well shaken from time to time, and at the end of twenty-four hours filtered for use; 0.1 c. c. of the solution of extract in 0.6 c. c. normal saline was employed for each tube in the experiments.

III. The syphilitic and other sera to be tested were inactivated for one hour at 57° C. before use, and 0.05 c. c. was, as a rule, used for each test tube.

To each tube used, 0.6 c. c. of normal saline was first added; the extract, sera, and complement were added as detailed and incubated at 37° C. for one and a half hours, at the end of which time the results were read; they were then placed over night in a cool chamber

and the results read again the following day. In one of the experiments the amount of complement necessary to lyse 1 c. c. of sensitized ox red corpuscles was 0.01 c. c.

This method of demonstrating the complement deviation phenomenon by the employment of gradually increasing doses of complement has this advantage, that it gives a definite idea as to the amount of complement absorbed; and in the various experiments only those cases in which an absorption of five or more doses of complement took place by the combined extract and serum, in addition to the amount absorbed by the extract and serum alone, were regarded as positive.

A review of these cases thus examined shows that out of 57 cases in which a clinical diagnosis of syphilis had been made, in 50 cases a positive result was obtained. Very striking was the amount of complement absorbed in some long standing cases of gummata with bone lesions.

Wassermann, in association with Plaut, conducted a series of experiments on the cerebro-spinal fluid of cases of general paralysis of the insane. In 41 out of 54 cases the cerebro-spinal fluid was found to contain substances which deviated complement in the presence of an extract of syphilitic liver; the blood sera of 19 out of 20 cases gave a positive result. The authors note that a distinctly positive result was found in many cases where a history of syphilis was denied, and they point out that the presence of the reaction was in no way associated with the length of time which elapsed between the syphilitic infection and the occurrence of paralysis. The same authors have also pointed out that out of a series of 100 cases in which there was a definite clinical diagnosis of locomotor ataxia 69 cases gave a positive syphilitic reaction, either with the blood serum or with the cerebro-spinal fluid, or with both.

One author shows that of the 23 cases of nervous disease examined by him, the blood serum of 19 gave a positive result, while the cerebro-spinal fluid of 9 out of 15 was positive.

The paper brings fresh evidence of the practical value of the complement deviation method in the diagnosis of syphilis or the syphilitic etiology of its sequels.—*Medical Inspector H. G. Beyer.*

ABE, NAKAO, Dr. Med. *Der Nachweis des Tuberclebazillus im Sputum (Tubercle bacilli in the sputum).* (From the Hygienic Institute, Univ. Kyoto, Prof. Dr. T. Matsushita.) *Arch. für Hygiene*, 67 Bd., 4 Heft., 1908, p. 372.

According to the author, a method for sputum examination must answer the following four requirements: (1) It must be simple and sure in its results; (2) it must be free from the danger of spreading infection; (3) it must furnish a sputum easily fixed on cover glasses; (4) it must give a clear picture.

While engaged in trying to kill tubercle bacilli in sputum with corrosive sublimate, the author had noticed that by this treatment he was able to convert the most tenacious sputum into a thin, homogeneous fluid by shaking it with three times its volume of a solution of HgCl_2 containing sodium chloride. On further experimentation and comparison with the sedimentation methods of Von Ketel and Nebel, he found the number of bacilli present in the following proportions, taking the original sputum as 1:

Original sputum.....	1
With 5 per cent carbolic acid.....	76
With limewater.....	176
With 2-1000 HgCl_2 +1 per cent NaCl.....	295

Since about eight times as many bacilli are contained in the supernatant fluid (after centrifugalizing) than are contained in the sediment, he filtered a whole sputum, treated with limewater, and one treated by a solution of 2-1000 HgCl_2 +1 per cent NaCl, with the following result:

Sputum.	Number of tubercle bacilli.		
	Original sputum.	Treated with limewater.	Treated with solution 2-1000 HgCl_2 +1 per cent NaCl.
I.....	1	234	756
II.....	1	262	1,176

Since limewater does not kill tubercle bacilli and is, consequently, not free from danger, the author recommends the HgCl_2 method as safer.

Method in brief: 5 to 10 c. c. of sputum are put into a glass cylinder of 100 c. c. capacity; added to this are 15 to 30 c. c. of a solution made up of HgCl_2 , 2 grams; NaCl, 10 grams; water, 1,000 c. c.; this mixture is shaken for ten minutes; 15 c. c. of this are centrifugalized for ten minutes, and the sediment examined as usual. Sputa poor in bacilli are not centrifuged but passed through a Berkefeld filter and the residue examined.—*Medical Inspector H. G. Beyer.*

WIENS, Dr., Marinestabsarzt. A summary of the most recently published work on the doctrine of opsonins. Deutsche Militärärztliche Zeitschrift, Berlin, 1908, p. 1036.

In this paper the author surveys with commendable care the published results of 36 workers in this field of research. His conclusions, after carefully summarizing and weighing the results so far obtained, are as follows: (1) The theoretical significance of the

opsonins for the doctrine of immunity is at present the subject of controversy and by no means clear. (2) The practical diagnostic as well as the therapeutical application of the opsonins is a matter for specially equipped institutes. The complicated nature of the method and the large number of sources of error, make the special training of men doing such work a necessity. (3) The views expressed by certain of the investigators to the effect that the determination of the opsonic index is of importance in the diagnosis and the treatment of tuberculosis are erroneous or go much too far. Just in tuberculosis we have at our disposal enough simpler methods to this end.

At the end of his article he mentions a recently published work of Rolly in which the author absolutely denies the diagnostic and therapeutic significance of the opsonins. The changes in the opsonic index show that there is absolutely no uniformity, neither in the sick nor the well. Opsonin determinations can not be relied upon as telling anything certain as regards the etiology of an infection in man. The special diagnosis of a bacterium by means of a specifically graded opsonin-containing serum Rolly believes to be an impossibility. In consequence of the noncontrollable and unaccountable changes occurring in the opsonic index, the greatest care becomes necessary in its therapeutic application.—*Medical Inspector H. G. Beyer.*

BIRT, C. (Lieut. Col., R. A. M. C.). **Experimental investigation on "simple continued fever."** *Journal of the Royal Army Medical Corps*, Vol. XI. No. 6, December, 1908, p. 566.

In the Mediterranean area, in 1907, no less than 548 cases were returned with the diagnosis of "simple continued fever." But since only 16 admissions for Malta fever and 58 for enteric fever were recorded for the year 1907, it is clear that some other cause is at work to account for the attacks of 548 cases of simple continued fever.

In the past, various short epidemics of three-day, five-day, and seven-day fevers have been described in medical papers, all of which are of an unknown etiology.

The fever described by Pick in 1886, occurring in south Herzegovina and the Dalmatian littoral, is a three-day fever, accompanied with some severe headache and backache and pain in the lower limbs, exceptionally, with vomiting and diarrhea, sometimes with a polymorphous fugitive rash. In 1908, Doctor Doerr wrote a paper on an "Invisible new virus," and states that the illness is common in Italy, where it is known as "summer fever," "climatic fever," "summer influenza," or "malarial influenza." Blood cultures and search for protozoa proving negative, he resolved to experiment on man,

the disease never being fatal. He took blood from a patient in Herzegovina on the first day of the illness, allowed it to clot, and dispatched the serum to Vienna, where the disease was not endemic. Though the serum was three and a half days in transit, 0.5 c. c. injected under the skin of his assistant, Doctor Raubitschek, induced a typical attack eight and a half days later. A second experiment with 1 c. c. of blood subcutaneously resulted in fever on the fourth day. Blood drawn forty-eight hours after the onset of pyrexia was no longer virulent.

He concludes, therefore, (1) that the virus circulates in the blood on the first day of the fever and that it is also present in the serum; (2) that the blood is no longer infective at the end of the second day; (3) that the virus is resistant and retains its infectivity for three and a half days.

The virus passes through Berkefeld and Reichel filters. The disease is commonly called "Hundskrankheit." Having been attributed to the bite of a dipterous insect, locally known as "Pappatici." Doerr experimented with this insect and succeeded in transferring the disease from those sick with it to the healthy in a few instances; the insects did not transmit the disease until eight days after biting a "Hundskrankheit" patient. The insect (*Phlebotomus*) occurs in tropical and subtropical climates, and is found in southern Europe, the Mediterranean, Egypt, West and Central Africa, South America, and India. The author suspects that the observed facts may explain the prevalence of short fevers of uncertain origin, 2,553 cases of which appear in the British Army Indian Returns for 1907, which entailed a loss of 36,600 days' service.

Doerr concludes that the Dalmatian and Herzegovina three-day fever is caused by an invisible virus conveyed by *P. papatassii*. Doerr's researches recall to mind those of Ashburn and Craig on 800 cases of dengue at Manila. It is also not unlikely, but rather probable, that the Mediterranean "simple continued fevers" are of similar origin.—*Medical Inspector H. G. Beyer.*

HYGIENE AND SANITATION.

Medical Inspector H. G. BEYER, U. S. Navy.

FIRTH, R. H. (Lieut. Col., R. A. M. C.). On the application of heat for the purification of water with troops in the field. *Journal of the Royal Army Medical Corps*, Vol. XI, No. 6, December, 1908, p. 570.

After P. G. Griffith had shown that the lethal temperature for the ordinary water-borne pathogenic micro-organisms was 82° C., Firth began experimenting with an improved apparatus for steriliz-

ing water in the field by heat in 1906. While the original small machine gave but 60 gallons of water per hour of a mean temperature of 10° above that of the ingoing water, at an expenditure of $1\frac{1}{2}$ pints of oil fuel, this larger machine delivers 350 gallons hourly of the same coolness at an expenditure of 1 gallon of oil for each 480 gallons of water sterilized. Located on the banks of a brook, this sterilizer served as a water depot from which the various regimental water tanks were filled. Later on the outfit was improved and a canvas storage tank was added. This tank carried 400 gallons of water and weighed 30 pounds. From his experience during maneuvers in the field, the conclusion drawn is that, given a suitable machine or sterilizer, water can be purified by heat under field service conditions. But the system must be that of establishing water-supply depots for each brigade, or one sterilizer for each 3,000 men. If utilized as a brigade unit sterilizers can be made to constitute the base on which the whole water service of the brigade could rest. It could be so located that water tanks from the most diverse units would find it convenient to use the source more accessible at the time. As a unit with a brigade its daily location at any convenient source of water supply is at the disposition of the command.

Follows a description of an ideal apparatus:

The weight of individual parts would be: Boiler, 180 pounds; supply tank, cooler, and sterilizing vessel, 250 pounds; the pair of steam pumps, 245 pounds; the pair of clarifiers, 60 pounds; the oil reservoir, 10 pounds; and the hand pump, 20 pounds. These give a total weight for the rear load, or sterilizer proper, of 755 pounds. The delivery of purified water from this apparatus should be 400 gallons per hour. The weight of the front cart, wheels, and platform on which the sterilizer is mounted would be 1,350 pounds, making, with the equipment carried in the cart, the total load behind two horses 2,850 pounds, which is not excessive for two horses.

Experience seems to indicate that the brigade of 3,000 men affords the most economical basis on which to organize such a water service. This means 4 sterilizers and 16 men in charge thereof for a cavalry division; 5 sterilizers and 20 men for an infantry division with divisional troops. For army troops, 3 sterilizers and 12 men. This gives a total need, for 1 cavalry division, 6 divisions and army troops, of 37 sterilizers and 148 men constituting their working squads.

Under existing conditions there is need for 699 men for water duties in the field force of 135,430 of all ranks; 100 horses are needed. The price of each sterilizer is £200, or the whole 37, for a force of 135,000 men, about £8,000.—H. G. B.

MASUCCI, Dott. A. **Catarrhal icterus of Eberthian origin.** (From the Naval Hospital of Taranto.) *Ann. di medicina navale e coloniale*, Vol. II, Fasc. IV, October, 1908, p. 477.

The author tells us that as far back as May, 1906, his attention had been attracted to the simultaneous recovery in the hospital of three patients from the "Goito," one from typhoid and two from catarrhal icterus. The coincidence had been all the more striking, since during the year no other cases of either of these diseases occurred. His sea duty, however, had prevented him from following up the question at that time.

In June and July of 1907 he again had 7 cases of typhoid on the *Sicilia*, together with 3 cases of icterus, and, as had occurred before, no other cases of either disease were noted during the remainder of that year.

The same was experienced again during the year 1908 at the hospital. In the first seven months of that year he was able to collect the data of 24 cases of typhoid, interspersed by 11 cases of catarrhal icterus, while during the following two months and a half neither typhoid nor icterus occurred.

In all these cases of icterus the Gruber-Vidal reaction proved positive. Twice the bacillus of Eberth was demonstrated in the *fæces* and five times in the urine. The Gruber-Vidal reaction remained positive until all traces of bile had disappeared from the circulation and a few days after.

The author firmly believes that this form of icterus may be diagnosed clinically from other forms by the following symptom-complex: Splenic tumor, rapid pulse, diarrhea, sometimes slight albuminuria, notable depression, all symptoms characteristic of a general systemic infection of the organism; in other words, just what we would be led to expect to find in a general typhoid infection.

The relation between the typhoid bacillus and the biliary passages are to-day well known. The author quotes Sanarelli, who wrote as long ago as 1894: "Typhoid fever can not be considered merely as an intestinal affection any more than variola can be considered as only a disease of the skin. The intestinal trouble of the one and the cutaneous exanthem of the other represent neither the seat of the virus nor what is called the essence of the disease. Whenever these lesions appear with unusual gravity they constitute merely the most dreaded complications."

The localization of the bacilli of typhoid fever are secondary to the general infection. The bacilli may invade the gall bladder, develop there, abide there for a long time, and give rise to a variety of manifestations, from a simple catarrhal icterus to Weill's disease, acute yellow atrophy, and calculi. It may be said that benign catarrhal

icterus is one of the many phases in the polymorphous character of a typhoid septicæmia.

Catarrhal icterus may, therefore, be caused by the typhoid bacillus. This fact is not only of considerable clinical importance, but also of the greatest possible importance from a hygienic point of view and prophylaxis, since it will be evident that all such cases may have the value of bacillus-carriers and give rise to an epidemic of typhoid fever anywhere and at any time, and consequently they must be treated as actual cases of typhoid fever from a prophylactic point of view.—(H. G. B.)

GIANNONE, Dott. ARRIGO (R. Marina). **The epidemic of typhoid fever on H. M. S. Regina Elena.** Ann. di medicina navale e coloniale, Vol. II, Fasc. IV, October, 1908, p. 457.

The *Regina Elena* left Spezzia about the middle of November, 1907, for a short cruise in the Atlantic. She had gone to Spezzia for about twelve days' repair, and before leaving port had filled up her sweet-water tanks with water from the arsenal. While there some of the men had been on shore on liberty. The general health had been satisfactory, with the exception that on the twelfth day of her stay in port a gunner was taken sick with fever, and since that occurred only two days before her departure the man was sent to the hospital on shore, where the diagnosis of enteric fever was made.

After the vessel had left port 12 more cases occurred in the following sequence: November 22, 24, 25, 28, 29, December 2, 4, 7, 11, 13. It was noted that the later from the date of departure of the vessel from Spezzia these cases occurred, the milder the symptoms and course of the disease became. The entire epidemic remained limited to 1.69 per cent of the total complement of the vessel, which was 707. The abrupt commencement of the epidemic, its rapid extension, gives it the character of a water-borne infection, especially when the great variability of the incubation period is taken into consideration and which is known to vary within wide limits, as recorded by different observers.

That the disease was contracted at Spezzia was proven by the fact that an epidemic at that place developed simultaneously, and also by the other fact that it did not spread on board the *Regina Elena*. Since, however, the water from the arsenal with which the tanks had been filled had been used for drinking water for several days after leaving port and distilling was not begun until November 28, it is not entirely out of the question that some of the later cases may have been contracted on board.

On careful investigations and after eliminating all possible and probable sources of continued infection, the author considered that

the carbon filters in the fountains might have kept the germs viable and virulent enough to spread the disease, although he admits that he was without the necessary means to prove this bacteriologically.

The author believes that all other modes of transmission may be safely eliminated. All excrements were duly disinfected and then thrown overboard on the principle of "tout-à-la-mer;" the patients were isolated and the water tanks and pipes cleaned, disinfected, and re-covered with cement; the clothes and bedding sterilized in the ship's sterilizer.

Giannone is of the opinion that, providing no fresh germs are admitted to the drinking water, the bac. Eberth loses its virulence by degrees and the epidemic ceases. He considers carbon filters as double-edged swords, of little use and as necessitating frequent changes. Porcelain candles are recommended, and where for any reason these are impracticable the cleaning of tanks and pipes, followed by disinfection with a soldering lamp, is the best means.

He insists upon the rounding of all the angles in the pipes to prevent the formation of deposits in them and to admit of rapid cleaning.—(H. G. B.)

SCHMINCK, Dr., Stabsarzt, n. SCHADEL, Dr., Oberarzt. The treatment of sweat-foot in the army. *Deutsche Militärärztl. Zeitschr.*, December, 1908, Berlin; p. 999.

This subject is not entirely without interest to naval hygiene.

The authors quote Krause as having estimated the total number of sweat glands in the skin to be about 2,350,000. Within the limits of a square inch of surface on the back there are from 440 to 600 sweat glands and about the same number on the cheeks, arms, and legs. The sweat glands are most numerous on the palm of the hand and the plantar surface of the foot, where from 2,685 to 2,736 have been counted to the square inch. The total outlet area of all the sweat glands of the body amounts to 0.143 square meter, assuming that a single outlet opening measures on the average about 0.06283 square millimeter.

Fresh perspiration is a germ-free, colorless, and slightly turbid fluid of a peculiar salty taste, but without a disagreeable odor due to fatty acids; its reaction is acid. The amount of perspiration varies within wide limits in perfectly healthy people; in many of them it occurs at a uniform rate over the entire surface, but most frequently certain portions of the surface show a larger amount of secretion than do others. This occurs under conditions that must be considered as perfectly normal. It is only when the normal amount of perspiration is checked that dangerous consequences follow.

Most frequently it is about the hands and feet that an abnormally increased perspiration occurs. As a rule, such perspiration is per-

fectly normal in composition and does not constitute what is called "sweat-foot." It is only when evaporation is prevented that the perspiration undergoes a process of decomposition, becomes alkaline in reaction and begins to smell badly, producing a condition in the feet that impairs the marching capacity of the men. For the purpose of the prevention or of the cure of this condition, we must strive, not so much to interfere with a perfectly normal physiological process, but to remove the products of perspiration, keep them normal, and prevent their decomposition.

The washing of the feet in tepid water, in solutions of salicylic acid 1:1,000 and of boracic acid 10:1,000, or of acetic acid 20 drops to a liter, of aluminium acetate 2:100, etc., has but a temporary effect unless this is combined with some other medicinal treatment.

Medicinal treatment, to be effective, must (1) be simple and clean in its application; (2) not prevent perspiration; it must keep (3) the perspiration fresh and acid in reaction; (4) its effect must be permanent.

After a most extensive trial with formaldehyde salve on many hundreds of men affected with sweat-foot, it was found that the temporary beneficial effect of this salve was due to its attacking the functions of the sweat glands themselves and that it was accompanied by burning sensations and by rendering the skin dry and brittle. The salve was generally rubbed in at night and from 2 to 6 rubbings were found to be necessary for effecting a cure.

The applications of tallow, mixed with salicylic and boracic acids produces a very disagreeable condition in boot and stockings. Acids alone, in powder form, irritate the skin. Starchy substances become pasty and attract molds.

A permanent effect can be expected to be produced only by a non-volatile acid and which does not irritate the skin. To this end, the acid must be combined with some form of fat to keep the skin soft, but the amount of fat must be small, so as not to neutralize the effects of the acid. A due regard for cleanliness permits the use of but a small amount of fat and necessitates it to be employed in powder form.

All these numerous requirements are best met by "borsyl." This consists of a mixture of 30 parts of boracic acid and 2 parts of fat (cetaceum and æthal). It represents a finely pulverized fat, keeps the skin soft and unchanged, is clean in its application, simple, non-poisonous, keeping the perspiration fresh and preserving its acid reaction.

The experiments and observations made with this substance on a large number of cases of sweat-foot gave the most favorable results. The powdered borsyl is put into the foot-cloth or socks in the morning before the march and after washing the feet, which latter, how-

ever, is not absolutely necessary. Fifty grams of borsyl suffices for 18 to 20 men.

The authors conclude that, for the present, the most rational remedy for the condition known as sweat-foot, and its immediate consequences, is borsyl.—(H. G. B.)

BOCHALLI, DR., Obersarzt. Zur Verbreitungsweise der Genickstarre (A contribution to our knowledge of the spread of cerebro-spinal meningitis). Zeitschr. für Hyg.- und Infektionskr., Bd. 61, Heft 3, p. 454, 1908.

That epidemic cerebro-spinal meningitis is chiefly spread by healthy coccus carriers has by this time become a well-recognized fact. The experience recorded by Bochalli is of special interest to us on account of the fact that this disease continues to recur with an ominous regularity on almost every receiving station for recruits and is thence carried to every ship and foreign station.

Bochalli tells us that on March 20, 1906, a musketeer from the Ninth Company of Infantry was brought to the hospital in an unconscious condition and the disease was promptly diagnosed as cerebro-spinal meningitis from its clinical symptoms. On the 28th of March, an examination of his 16 roommates showed that 10 of them had meningo-cocci in the mucus taken from the naso-pharyngeal space. Three of the 10 in the neighboring room also showed cocci and 3 more were discovered among the men living in the other rooms. In all, 16 out of 41 men quartered in the neighborhood of this man were found to be coccus carriers.

Extending the examinations to 485 men, 42 coccus carriers, or 8.6 per cent, were discovered. A grouping of the men showed clearly that the highest percentage of coccus carriers was found among his roommates, namely, 10 out of 16, or 62.5 per cent.

Ostermann found that 17 out of 24 members belonging to the same family (70.8 per cent) were coccus carriers. Bruns also had found, during the rise of an epidemic, that 162 in 330 in the neighborhood of those sick with the disease (50 per cent) were coccus carriers. Similar experiences are recorded by v. Lingelsheim and by Trautmann and Fromme. Percentages of coccus carriers all the way from 20 to 100 per cent are recorded in almost direct proportion to the proximity of the well to the sick. Likewise, in the experience of Bochalli, the percentage varied in the same sense from 5.4 per cent to 11.4 per cent. Bruns and Flügge have estimated that during an epidemic the number of coccus carriers may amount from ten to twenty times that of the actual number of cases of the disease.

In the above instance an outbreak of the epidemic was undoubtedly prevented by the prompt isolation of the first case and of the coccus carriers, and the fact that among the isolated coccus carriers

no more cases did occur is explained as due to the slight general disposition of adults to the disease.

The fact, however, that coccus carriers do not always occur, or accompany, at least, isolated cases of the disease is shown by the case reported by B. that was imported into Switzerland from Breslau. This woman, 25½ years of age, developed the disease at Davos, having been exposed to it at Breslau, without infecting any of those in her immediate neighborhood in Switzerland. This was shown by an examination of the mucus from the naso-pharyngeal space in 45 persons.

The two cases of cerebro-spinal meningitis occurring on the U. S. S. *Maryland* in 1907 in Manila Bay would tend to show how far from home the disease may be carried by coccus carriers, and, secondly, how slight the susceptibility of adults must be when even under the crowded condition of ship life it could have remained latent for months without developing a single case. For it must here be assumed that the germs were carried from home ports, because it is not a tropical disease and did not exist at any of the ports visited by the fleet during its passage from the United States to Manila Bay. Some climatic influences seem to have been sufficient to develop these cases, just as was the case with the woman coming from a place of low to one of high altitude in Switzerland.

On account of the extreme delicacy of the coccus and the slight resistance which it has to conditions implied in being transferred long distances on sterile cotton, great stress is laid upon the direct transmission of the mucus from the naso-pharyngeal space to freshly-prepared ascites-agar plates (1 part of ascites, 3 parts of 2½ to 3 per cent neutral agar). The plates are kept for forty-eight hours at 37° C. in the incubator. Typical colonies are described as round, gray transparent, 3 to 4 mm. in diameter, with raised center and a flattened peripheral zone. Suspicious colonies, examined with a Leitz 3, ocular 1, show that the cocci appear in the form of yellow homogeneous disks with smooth margins, while others, as *micrococcus catarrhalis*, show coarse granulations. From such colonies gram preparations were made. In case gram-negative diplo- or tetra-cocci, unequal in size and staining intensity, are noticed, ascites-agar plates are inoculated from such colonies; likewise, a bouillon tube is inoculated and from such a tube transfers to ascites-agar plates are made. The manner of growth on the plates was watched and the fermenting properties on grape sugar, maltose, milk sugar, and levulose, was ascertained. The cocci grow sparsely during the first generation and only near the condense water; they ferment only grape sugar and maltose. Agglutination tests were also made. The examination shows that great care was exercised in the search for the specific cocci. The necessity for such care had been previously dem-

onstrated, for during an examination of 611 specimens of mucus from the nose from persons in the neighborhood of cerebro-spinal disease, transported on sterile swabs, all gave a negative result.—
(H. G. B.)

GÄRTNER, Prof. Dr. A. **On Book Disinfection on the Large Scale.** (From the Hygienic Inst. University Jena Gy., Dir. Geh. Hofrat Prof. Dr. A. Gärtner.) *Zeitschr. für Hygiene u. Infektionskr.*, Bd. 62, 1908, p. 33.

The question as to the necessity of disinfecting books, magazines, and papers passing from hand to hand has repeatedly been answered in the affirmative. Tubercle bacilli have been found in and cultivated from the pages of books of circulating libraries, and the transfer of such bacilli through the fingers of the readers from such infected books to their own persons is but one of the many accepted possibilities. It has been a matter of frequent observation in the past that measles, scarlatina, etc., have been spread by infected magazines and papers, as well as letters, to great distances. Regulations governing the disinfection of books are not wanting in European countries, as well as in some of the United States of America. The same question might become one of great importance on ships with circulating libraries, especially in cases of epidemics, and mail bags arriving from an infected port have often had to be disinfected.

The employment of formalin for the disinfection of books has for many reasons been found unsatisfactory and practically abandoned. Pure steam, while killing the bacteria, ruins the books, liquifying the glue used in binding, injuring the colors of illustrations, and rendering leather brittle. Dry heat, although better than steam, penetrates too slowly and gives the white pages of the books a brownish hue.

It occurred to Gärtner that a disinfectant for purposes of book disinfection might prove satisfactory when employed in the form of a gas and when combined with the vacuum principle in a suitably constructed apparatus. Not long after engaging in studying this problem he hit upon alcohol, diluted with water, as one of the best disinfectants for books. The mixture is easily volatilized, leaves no disagreeable odor behind, and its sterilizing power can be materially increased by the addition of heat.

In testing the efficacy of suitable mixtures, books were infected by a number of the more common bacteria, such as bacilli coli, typhoid, paratyphoid, staphylococci, streptococci, cholera, dysentery, influenza, pneumonia, and tuberculosis.

He began by first studying the disinfectant value of various agents upon infected paper slips in a small box used to heat the microscope in. Thus he found that at a temperature of 75° C. and with a 25 per cent steam staphylococci and bacilli coli were still alive after fifteen

minutes' exposure, but that they were killed at the end of two minutes at the same temperature, but with 100 per cent moisture in the air of the apparatus; while with 75 per cent moisture at the same temperature the staphylococci were dead and bacilli coli still alive at the end of an exposure of fifteen minutes. At a temperature of 52° C. and 100 per cent of moisture the infected samples of paper showed virulent bacilli at least ten minutes, and at 62° C. no live bacilli were found at the end of two minutes' exposure. When, however, the air inclosed in the apparatus was saturated not only with steam, but also, and at the same time, with alcohol, all the bacteria were found to be dead at the end of two minutes, not only at a temperature of 52° C., but even at a temperature of 45° C.

After these preliminary experiments with paper slips, books were infected in such a way as would leave no doubt of the thoroughness of the process.

After experimenting in various ways and overcoming a number of technical difficulties with an apparatus in which a vacuum could be produced, it was found that with a negative pressure of 730 mm., equal parts of alcohol and water, and with a temperature of 50 to 55° C. complete success was obtained at the end of one hour's exposure. The principles of the process having been worked out, an enlarged apparatus for the disinfection of 1,000 books was constructed by a firm at Weimar. The apparatus had to be so made as to admit the production of a vacuum, of a quick and uniform heating, as well as a quick and uniform distribution of the disinfectant. The details of construction of the apparatus and its management are fully illustrated in the original paper above referred to.

The process of the disinfection is completed in two and one-half hours. Seven liters of alcohol are required for the disinfection of 1,000 books. The work can be done by two persons. The results have been uniformly excellent in every way. The books do not suffer when the apparatus is handled properly, and 400 books may be disinfected within ten hours. Such an apparatus therefore makes it henceforth possible to protect from infection by books the reading public and should therefore be installed in every library of the community.—(H. G. B.)

ABE, NAKAO, Dr. Med. **The etiology of impetigo contagiosa.** From the Hygienic Institute, University of Kyoto; director, Prof. Dr. T. Matsushita.) Arch. für Hygiene, Bd. 67, 1908, p. 367.

At present impetigo contagiosa is recognized to be of bacterial origin. But whether the bacteria are streptococci (Kurt, Brochet) or staphylococci pyogenes aureus and albus (Pogge, Bousquet, Leloir, Bockhart, Dupray, Wickham, Matzenauen, Engmann, etc.), or

whether they are some specific micro-organisms (Unna, Kaufman, Dohi-Kurita, etc.), is still an open question.

Dr. Nakao Abe, during a journey to Satsuma, in southern Japan, in 1906, had occasion to observe a small epidemic of impetigo contagiosa. The contents of the small blisters consisted of a small number of polynuclear leucocytes, many diplococci, of which some were intra, others extra cellular. Transplanted onto suitable culture media Abe found, quite regularly, two different grayish-white and yellow colonies appeared. The cocci of both were round, nonmotile, staining after Gram, measuring 0.5 to 0.8, either in pairs or single, sometimes even arranged in short chains or in small collections like staphylococci. The cultural characters were nearly, but not quite, the same as those of pus cocci. As a rule, however, he found the cocci of impetigo somewhat less resistant.

Inoculating four adults with a forty-eight-hour pure culture of these organisms, typical impetigo pustules developed after two to three days, the contents of all of which were identical with those in the original culture. Positive results were seen in all the four cases inoculated. The white strain was found to be less virulent than the yellow strain. It was, moreover, found that bathing in Japanese bath tubs filled with water containing the impetigo cocci was followed by the infection of healthy adults.

The author, therefore, was forced to conclude that the micro-organisms found by him were the certain etiological causes of impetigo, and that both the white and the yellow races were the same, inasmuch as he has observed that the yellow race changes into the white race.

Since inoculation of the skin with micrococcus pyogenes aureus and albus is followed by furuncles, and not by impetigo, he concludes that the impetigo cocci are different from the pus-producing cocci, in spite of the fact that both races resemble each other in cultural characteristics.—(H. G. B.)

SIMPSON, R. J. (C. M. G., Lieutenant-colonel, R. A. M. C.). Tuberculosis in the British army and its prevention. Journal of the Royal Army Medical Corps, January, 1909, Vol. XII, No. 1, p. 18.

The author first compares the present prevalence of tuberculosis with that in former years, and then to those alterations in conditions to which any changes in the prevalence may be attributed. Since, moreover, the army of a country is, after all, only a portion of the general population, subjected temporarily to different conditions, some reference is also made to the prevalence of the disease in the islands themselves. He summarizes the result of his inquiries in

two propositions: (1) There has been a marked decrease in the morbidity, mortality, and total loss during the last forty-six years. This period is divided into two subperiods, the earlier of rapid decrease, the later of slower. (2) The one element which appears to have been effective in producing the rapid decrease of the earlier portion of the decrease was increased air supply, including increased cubic space and improved ventilation. The slighter degree of improvement during the later period is due to causes of secondary importance.

Further improvement to any marked degree would appear to be possible in two ways only: (1) Earlier recognition and elimination of cases of tubercular infection, so as to diminish the chances of contagion. In this Calmette's ophthalmo reaction will give valuable assistance. (2) Education, not only of the soldier, but of the general population in all that concerns the prophylaxis of tubercular infection.—(H. G. B.)

DELOGU, Dr. A., Capitano medico nella Regia Marina. Symptoms that may be attributed to soldering with the oxy-hydrogen flame. (A contribution to the study of industrial diseases.) *Annali de medicina navale e coloniale*, Vol. II, Fasc. V., November, 1908, p. 577.

Delogu, while on duty at sick quarters at the royal arsenal at Spezzia, noticed among the workmen engaged in soldering with the oxy-hydrogen flame zinc and brass, six cases, all showing an almost uniform group of symptoms—headache, more or less severe, confined to the forehead and temples; pallor of the skin and of the exposed mucous membranes, indicating a certain degree of anæmia; tremor of hands, especially fingers; disturbances about the digestive organs, especially as to mouth and stomach; coated tongue; fetid breath; pain in the pharynx and larynx; loss of appetite; painful pressure about stomach, with flatulence and eructations. Spleen slightly enlarged in the more serious cases, then nausea. A sense of discomfort with general prostration. In one of the cases a rise in temperature was noted. In the first, second, and sixth cases albumen was discovered in the urine, and in the first two cases traces of arsenic were found.

After a careful perusal of the literature, and after still more carefully sifting the chances fit to support an opinion, he concludes that the most probable theory is that the arsenic came from oxydized arsenical compounds, volatilized during the process of soldering, and inhaled by the workmen.—(H. G. B.)

WOOD, SIR EVELYN, V. C., field marshal. *Tactics and the health of the army, 1848-1908.* (Reprinted from the *Saturday Review*), *Journal of the Royal Army Medical Corps*, Vol. XII, No. 1, January, 1909, p. 8.

British army surgeons are indeed to be very much congratulated when one of their own generals, like Sir Evelyn Wood, sounds their praises as he did in the *Saturday Review*. It would seem as if henceforth a new sun had risen over a clearer and brighter horizon to shine on and illumine in a more helpful way than in the past their many fields of sanitary usefulness in the army and make work easy where it had been hard before. The recognition by officers of high rank in an army of the true bearing of sanitation on tactics must be considered an important step in the right direction. In the present case it must be regarded as a triumph due to the patient and persistent efforts of the medical profession, as represented by the army medical corps, and will prove not only of the greatest interest to the army surgeon, but will also be of benefit to every soldier in the ranks.

The example of General Wood will no doubt in time be followed by every officer in the army having its welfare and success at heart. It marks an epoch in the history of sanitation of the service. The author merits a degree of "M. B." with a new interpretation—that of "Militium Benefactor."

General Wood says, among other things: "Important as is the higher training in tactics, or the art of killing with the minimum of personal risk, yet all improvements therein have been surpassed by the life-saving labors of the army medical department. It is probable that future generations will acclaim surgeons as the most notable benefactors of the human race during the Victorian epoch, but their art only came into use after battles, and for every ten men saved by the skill of surgeons, preventive medicine saves its tens of thousands." After comparing in a most practical and telling manner conditions old and new he continues, saying that: "The changes in the medical department within the writer's staff service, which began over fifty years ago, are, indeed, remarkable. * * * Old officers must realize now the great advantages of the change, but it is probable that few laymen appreciate the immensity of the advance. It may to some extent be appreciated by the perusal of the *Monthly Journal of the Royal Army Medical Corps* * * * which even to a combatant officer without any medical knowledge shows how the standard of professional knowledge is rising. The association of doctors with the gymnastic staff will not only prevent injury being caused by zealous instructors without anatomical knowledge, but will tend to keep the true principle in view—that the object of all physical training is the increase of the working capacity of the soldier.

"The army council has recently decided that sanitation shall in future form one of the subjects for examination for promotion for junior regimental officers. The importance of this step may be judged by recalling that in the first army staff ride, carried out in 1897, there were no medical officers employed. Now their attendance and instruction are generally assumed as being essential.

"In the Scottish Command, by means of a Station Sanitary Book, the officer in command and the officer in medical charge have been brought into close and effective relations. All this is satisfactory, but more remains to be done. I am convinced from my experience of thirty years as a general that the army doctors should be regarded not merely as healers of the sick and wounded, but as trusted staff officers to advise their chiefs how to guard the troops against the originating and spreading of disease and thus maintain the number of effectives in a campaign. This will result not only in the increasing of fire effect, but will raise immensely the fighting value of the troops and will incidentally enable us to reduce the costly and cumbersome hospital establishment and transport."

In this connection we can hardly refrain from recalling what the *Lancet* said in 1905, in an article entitled "Medicine, Its Practice and Its Public Relations," April 22, 1905, page 1090, with reference to the same subject, but regarding the naval medical service: "The time, it is hoped, may be approaching, when our naval medical officers will receive full subsidies by the Government. That time will be when the admiralty recognizes *that a medical officer in the navy does not exist only to "doctor people," but that he has functions of the highest importance to discharge in the prevention of disease.*"—
(H. G. B.)

REPORTS AND LETTERS

SEVENTEENTH ANNUAL MEETING OF THE ASSOCIATION OF MILITARY SURGEONS.

Medical Director Manley H. Simons, U. S. Navy, represented the medical corps of the United States Navy at the meeting which was held at Atlanta, Ga., October 12, 1908. Doctor Simons reports as follows:

The meeting of the executive committee was held in the evening of October 12. Seven members only were present, and the president of the association presided. The following recommendations were adopted, to be laid before the association: That the membership of the association be limited to medical officers having commissions signed by the President or governors of States; that members wear the uniform of their rank at the meetings, unless permission be given by the presiding officer to appear in civilian dress; that the insignia of the association be conferred upon foreign delegates; that the use of the Red Cross on various articles made by private firms be forbidden; that the expense of printing the Military Surgeon, and of the secretary's office, be paid hereafter by requisition on the treasurer, approved by the president; that an arrangement be made with Mr. Enno-Sanders by which his annual gift will be in some other form, and the secretary was authorized to confer with him on the subject. The medal this year was conferred on Passed Asst. Surg. W. C. Rucker, Public Health and Marine-Hospital Service. The reports of the various committees were submitted and approved. The financial condition of the society is good, 71 members having been added this year, making the total number over 1,400. It was decided to meet in Washington in 1909, the date to be decided by the executive committee. Surg. Gen. P. M. Rixey, U. S. Navy, was nominated and elected president for the coming year. The other officers now acting were reelected, and Surg. C. P. Wertenbaker, Public Health and Marine-Hospital Service, was elected fourth vice-president. Thursday morning the president-elect was installed and made an address. He was followed by the foreign delegates, who made brief addresses to the association. The association adjourned its business meetings Thursday noon, but the legal time did not expire until Friday evening.

Tuesday afternoon an automobile ride was given to the members by Surgeon-General Brown and Surgeon Lindorme, of Atlanta, to various points of interest in and near the city. Tuesday evening the association met in the legislative hall, state capitol, to listen to addresses of welcome from representatives of the State. The president of the association read the annual address. His subject was "The suture of wounds of the heart." The secretary also conferred the insignia of the association upon the foreign delegates from Great Britain and from Portugal. There were present delegates from the medical services of Great Britain (the Royal Army Medical Corps, the Indian Medical Service, and the Canadian Medical Service), of Portugal, and of Mexico.

Wednesday evening the Fulton County Medical Association gave a reception to the military surgeons at the Piedmont Driving Club. Thursday the fair grounds were thrown open to the members. Friday at 11 a. m., a barbecue was given by the officers of the military organization of the city, a very pleasant affair. There were apparently less than 100 members of the association present at the meeting, and but few papers were read.

Maj. C. B. Ewing, U. S. Army, read a paper on the "Assault by the United States Forces upon the Moros at Bud-Dajo," and commented particularly on the little pain and absence of bad results caused by bringing the wounded out by pack mules through the devious tropical paths. A cot was strapped upon a platform of poles, attached to the pack saddle, and the wounded man was strapped lightly in the cot.

Acting Asst. Surg. W. T. Thackery read part of a paper on "Hypodermic Anæsthesia," but it could not be finished in the time allowed.

Iron-aristol, a mixture of aristol and dried sulphate of iron, was advocated as a very successful application to chronic skin ulcer in a paper read by Passed Asst. Surg. M. J. White, Public Health and Marine-Hospital Service. The powder is dusted on the clean surface, the excess blown off, and the ulcer is then dressed with unguentum zinci oxidi and protective. The process is repeated every forty-eight hours.

A short paper was read by Col. J. R. Weaver, Pennsylvania National Guard, on "Hygienic Maxims for the Soldier," and cards bearing these maxims were distributed.

"A Segregating Latrine for Temporary and Semi-permanent Camps" formed the subject of a paper by Maj. G. S. Crampton, Pennsylvania National Guard. A model of the device was presented. The latrine is circular, made of thin sheet iron, and weighs about 150 pounds. One with six seats is 4 feet in diameter and stands

17 inches in height. A trough arranged to catch the urine only passes around under and in front of the seat. It is so inclined that the urine is carried to a hollow leg by which it empties into a hole in the ground. The fæces are caught in a waterproof cloth sack, which is tied by lines to the circumference of the latrine. To empty the fæces the lines are detached by two men and then act as a puckering string and sling, and the sack is carried off and burned in the incinerator. A socket in the center of the top plate holds a pole which supports an awning.

Maj. Herbert A. Arnold described verbally a flyproof sanitary latrine for temporary camps. The paper will be printed.

"A Card System as Adapted to Property Accounts" was described and advocated by Brig. Gen. C. C. Foster, M. V. M. It is used in Massachusetts and is found to be admirable and convenient.

Maj. G. H. Halberstadt, Pennsylvania National Guard, read a most interesting paper on "The Organization and Training of the First Aid Corps of the Philadelphia and Reading Coal and Iron Company and a New Model Mine Ambulance." He described the fine work, ingenuity, and readiness of the hospital corps, and stated that in case of emergency, or for war, a ready drilled and instructed hospital corps can be put promptly in the field from the organization.

Capt. S. Morgan Muron, New York National Guard, read a paper entitled "Service Schools for the Militia," in which these schools were advocated and the suggestion made that an inspecting and instructing board of army officers should be sent to the camps yearly.

"Sanatorium Management," a paper by Surg. Paul M. Carrington, Public Health and Marine-Hospital Service, consisted of a description of the methods of administration at Fort Stanton, N. Mex., and of the favorable results obtained in the treatment of about 150 patients of all ages.

Lieut. Col. Alejandro Ross, Army of Mexico, read a paper on "A Mexican Litter Especially Adapted to Transportation from the First Line to the Dressing Station." It was a description of the Mexican two-wheeled stretcher, an admirable device. Pamphlets of the address in English and Spanish were distributed.

REPORT AND RECOMMENDATIONS OF A BOARD OF OFFICERS, CONVENED AT THE NAVY-YARD, MARE ISLAND, CAL., FEBRUARY, 1908, ON THE PRECAUTIONARY METHODS TO BE TAKEN TO PREVENT THE INVASION OF BUBONIC PLAGUE AT THAT STATION. (Medical Director R. C. PERSONS, U. S. Navy, *President of Board*.)

The board has made a thorough inspection of those parts of the island that were suspected of being most infected by rats and

obtained ample ocular proof of the presence of rats in large numbers in many parts of the yard, particularly in the long grass at the foot of the slope behind the stables at the marine barracks, where garbage was formerly dumped; in and about the stables occupied by government horses and those of the team contractor, buildings Nos. 88 and 92; in the grass along the beach in front of the U. S. S. *Independence* and under the wharf leading to the ship; and in the sheds back of the small dwellings occupied by civil employees in the district called "Dublin." The water front in the shop district, with the exception of that part in the vicinity of Dry Dock No. 2 under construction, was found to be free of rats.

The location of the yard and the character of the concrete sea wall along that part of the water front where vessels lie make it a comparatively simple matter to prevent the ingress of any large number of rats from outside the yard; the principal avenue for such ingress would be from the tules at the north end of the island and ranches located north of the tules. Owing, however, to the size of the island and to the great extent of grass and weed covered area, it will be difficult, if not impossible, wholly to eradicate rats from the island. The board believes that by means of a vigorous campaign against rats now on the island, the rats in the quarters and in the vicinity of buildings occupied by workmen and enlisted men may be in large part destroyed and the remainder driven to the mesa or tules, where the lack of sufficient food to sustain a large rat population will bring about a great reduction in numbers. Steps should be taken at the same time to rat-proof all buildings containing food for rats and to prevent the ingress of rats from elsewhere.

By these measures it is believed the danger from infection with plague by means of rats will be minimized.

The board has the honor to submit the following recommendations:

(a) That all ships, government houses, shops, stables and other buildings where there is likely to be any accumulation of food scraps, be supplied with covered metallic cans of 20 gallons capacity each for the reception of garbage and other refuse food; that these cans be emptied daily and the contents taken in a suitable sanitary garbage wagon to the crematory and destroyed; that the receptacles themselves be properly cleansed and sterilized; that civilians living in the yard be required to comply with this regulation and furnish cans of approved type for use at their quarters, the collection of garbage being performed by the Government; that bins for feed and grain in stables and outhouses be lined with metal and provided with close-fitting, metal-lined covers; that all feed and grain be kept in such receptacles or in rat-proof rooms; that similar provision be made for the storage of flour in yard foundries.

(b) That no refuse food from vessels lying at the sea wall, from the receiving ship, or from torpedo-boat wharf, be thrown overboard; all such material to be placed in metal-covered receptacles, and burned as soon as practicable, as indicated in preceding paragraph.

(c) That all grain, hay, straw, and other feed, be inspected as soon as landed with a view to discovering whether any rats or mice are concealed therein.

(d) That a sufficient number of rat traps of approved design be supplied for use in the various shops, stables, and other buildings, and in catch basins and sewers; that these be freshly baited every day, and that each time rats be removed therefrom the traps be cleaned; a report of the number of the rats and mice ought to be made daily to the captain of the yard.

(e) That all hawsers, cables, and mooring lines of vessels lying at the yard be protected with metal cones or discs not less than two feet in diameter; and that a watch be kept upon the gangways to prevent the passage of rats between the vessel and the shore.

(f) That small crematories in addition to the one now in use at the north end of the yard be erected, one to be erected in the vicinity of the receiving ship, one to serve the Naval Magazine reservation and the torpedo-boat wharf, one within the Naval Hospital inclosure, and one at the Marine Barracks, for the destruction of refuse matter from these districts. This is recommended because the present crematory is at the extreme north end of the yard, a distance of over 2 miles from the Naval Magazine reservation, making the hauling of the garbage unnecessarily expensive; and because it is believed that the crematory is not of sufficient capacity for the demands that would be made upon it if all of the yard refuse were burned therein. These crematories should be made of small capacity and would be inexpensive both to build and operate. They could in general be taken care of by enlisted men.

(g) That the wooden floors of the stables throughout the yard be replaced by concrete floors, with a superimposed wood floor in the stalls; that the stable known as the "contractor's stable," building No. 92, be entirely removed, as it is in such a dilapidated condition that it is not believed to be capable of being properly rat-proofed at a reasonable cost; that the government stables, building No. 88, and the Marine and Naval Hospital stables be rendered rat proof, in accordance with the specifications adopted by the health department of San Francisco, and that in particular the drainage system of building No. 88 be repaired and modernized.

(h) That houses occupied by civilian employees, and outhouses, such as coal and woodsheds, etc., be raised so as to have a clear space of not less than 18 inches above the ground under the first

floor, and that where it is not practicable to raise such outhouses, the wooden flooring be completely removed.

(i) That rat-proof corrals be established at various locations for the storage of manure, particularly in the vicinity of buildings used as stables, and that no large quantity of manure be allowed to accumulate in the vicinity of any stables or premises, or be permitted to be piled anywhere except within such corrals, the corrals to be built by inclosing spaces with corrugated-iron fences, 4 feet high, and extending 8 inches below the surface of the ground, or with close-meshed wire netting similarly placed.

(j) That similar suitable inclosures or corrals be provided wherever chickens are kept, and that all feeding of chickens with grain or scraps of food be done only within such corrals, the corrals to be kept closed at all times when not actually in use.

(k) That no board walk be permitted to be less than 12 inches above the ground; all board walks which have a less height to be raised or replaced by concrete walks.

(l) That all useless lumber and combustible rubbish be burned; that no piles of such lumber be permitted to accumulate; and that lumber in storage, intended for further use, be piled in such a manner as to permit a clean space of not less than 18 inches between it and the ground.

(m) That the mouths of such sewers as are not submerged at extremely low water be protected by iron grating.

(n) That the space under the street bordering on the new dry dock now under construction, especially in front of building No. 122, be filled with earth or closed by suitable wire netting.

(o) That a certain space near the back of marine barracks stables, where rats congregate in large numbers, be burned over, and that attempt be made to stop up all holes in the banks with broken brick and glass, poisoned food having previously been inserted in the holes.

(p) That a rat-proof fence be extended across the island at the north end of the yard at a suitable location, from shore to shore, to prevent the ingress of rats from the upper tule lands.

(q) That the civil engineer be authorized to remove any board walks or platforms, any outhouses in the yards of officers, civil employees, or civilians, and any other unoccupied buildings not built from appropriations made specifically therefor, which in his opinion can not be rendered rat proof or which are in such condition as not to justify the expenditure of money for the purpose.

(r) That a sanitary squad, consisting of not less than 2 hospital stewards and 10 hospital corps men, be maintained, whose duty it shall be, under the supervision of a medical officer of this station, to inspect the yard daily, the yard for this purpose being divided into

certain sanitary districts; it shall further be their duty to see that sanitary regulations are carried out; that rat traps are properly set and baited; that rat holes are stopped up; that rat poison is effectively and safely distributed; and that any and all dead rats are properly collected and preserved for bacteriological examination or otherwise disposed of; and that to further maintain cleanliness and sanitation, the head of the Department of Yards and Docks furnish such labor as in his opinion shall be necessary to carry out the recommendations both of this board and of the medical officer of the station. * * *



NO. 3

VOL. 3

UNITED STATES NAVAL MEDICAL BULLETIN

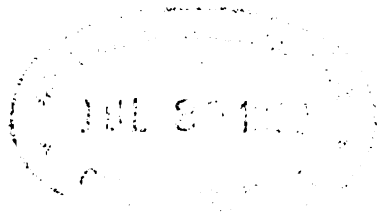
FOR THE
INFORMATION OF THE MEDICAL
DEPARTMENT OF THE SERVICE

LIMITED TO PROFESSIONAL MATTERS AS OBSERVED BY MEDICAL
OFFICERS AT STATIONS AND ON BOARD SHIPS IN EVERY
PART OF THE WORLD, AND PERTAINING TO THE PHYS-
ICAL WELFARE OF THE NAVAL PERSONNEL

JULY, 1909
(ISSUED QUARTERLY)



WASHINGTON
GOVERNMENT PRINTING OFFICE
1909



Handwritten text, possibly a signature or date, appearing below the stamp.

NAVY DEPARTMENT,
Washington, March 20, 1907.

This United States Naval Medical Bulletin is published by direction of the department for the timely information of the Medical and Hospital Corps of the navy.

TRUMAN H. NEWBERRY,
Acting Secretary.

(III)

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PREFACE.

The publication and issue of a quarterly bulletin by the Bureau of Medicine and Surgery contemplates the timely distribution of such information as is deemed of value to the medical officers and the hospital corps in the performance of their duties, and with the ultimate object that both shall continue to advance in proficiency in respect to all of their responsibilities.

It is proposed that the Naval Medical Bulletin shall embody matters relating to hygiene, tropical and preventive medicine, pathology, laboratory suggestions, chemistry and pharmacy, advanced therapeutics, surgery, medical department organization for battle, and all other matters of more or less professional interest and importance under the conditions peculiar to the service and pertaining to the physical welfare of the naval personnel.

It is believed that the corps as a whole should profit, to the good of the service, out of the experience and observations of the individual. There are many excellent special reports and notes beyond the scope of my annual report being sent in from stations and ships, and by communicating the information they contain (either in their entirety or in part, as extracts) throughout the service, not only will they be employed to some purposes as merited, but all medical officers will thus be brought into closer professional intercourse and be offered a means to keep abreast of the times.

Special attention will be given by the instructors of the Naval Medical School to the review of advances in medical science of special professional interest to the service, as published in foreign and home journals, and extracts from these will appear in the bulletin, together with such remarks as the instructors may deem of value to officers on foreign service or sea duty.

Information received from all sources will be used, and the bureau extends an invitation to medical officers to prepare and forward, with a view to publication, matter on subjects relating to the profession in any of its allied branches.

P. M. RIXEY,

Surgeon-General, U. S. Navy.

(VII)

SPECIAL ARTICLES.

NOTES ON THE TREATMENT OF ELEPHANTIASIS BY THE INTERNAL ADMINISTRATION OF TINCTURA FERRI CHLORIDI.

By Passed Asst. Surg. P. S. ROSSITER, U. S. Navy.

During my stay in Fiji en route to Samoa, I heard that a French surgeon in Tahiti had been treating elephantiasis successfully by a new method.

In December, 1907, the *Annapolis* made a trip to Tahiti, and I requested Assistant Surgeon Lando to obtain if possible a detailed account of this treatment in order that a trial of it might be made here. Upon the return of the *Annapolis* he informed me that he had had several conversations with Dr. Dubriel Du Broglie, of the French colonial medical service, the originator of this method of treatment, who described his treatment as consisting of the internal administration of 30 drops of tinctura ferri chloridi three times daily, in combination with bandaging of the affected limbs and complete rest in bed.

I was somewhat loathe to resort to bandaging and rest in bed; for any case of elephantiasis of the arms or legs will show diminution in the size of the affected parts under bandaging and rest, without the administration of any drug; but the size is promptly regained upon the removal of the bandages and the resumption, by the patient, of his usual mode of life.

I therefore determined to make the experiment of administering the tinctura ferri chloridi without bandaging and permitting the patient to follow his usual mode of life.

The first two men selected for experiment were half castes who had suffered from the disease for thirty and eleven years, respectively, and who volunteered to take the treatment regularly and for a long period.

Tinctura ferri chloridi 1.7 c. c. in 250 c. c. of water was given three times daily; except in the cases particularly mentioned, no bandaging was used and the patients followed their usual mode of life.

Case 1.—W. H. Y., half caste; age 55 years; occupation, clerk; has had elephantiasis thirty years. Right hand and forearm, left forearm, and right leg affected. Has suffered for many years from elephantoid fever, once or twice weekly, each attack lasting six to seven

hours; and for thirty years no period of one month has passed without an attack. No bandages used in this case.

The measurements of his limbs from the time of beginning this treatment to the present are as follows:

RIGHT ARM.

Date.	Hand.	Wrist.	Mid fore-arm.
	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>
Jan. 22, 1908.....	10½	8½	14
Mar. 10, 1908.....	9½	8½	13½
Dec. 31, 1908.....	9	7½	13½

LEFT ARM.

	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>
Jan. 22, 1908.....	8½	7½	12
Mar. 10, 1908.....	8½	7½	11½
Dec. 31, 1908.....	8	7	11

RIGHT LEG.

Date.	Ankle.	Calf.	Above knee.
	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>
Jan. 22, 1908.....	11½	17½	17
Mar. 10, 1908.....	11½	17½	16½
Dec. 31, 1908.....	11	17	16

This patient has had only four attacks of elephantoid fever during this period, and these lasting only ten to fifteen minutes each.

He had been wholly unable to write for two years on account of the elephantoid swelling of his right hand and wrist. He has entirely regained the use of this hand, the appearance of which has completely changed, the tendons showing and the hand appearing normal except upon very close inspection.

He continues under treatment.

Case 2.—G. S., male; half caste, age 54 years; occupation, police. Has had elephantiasis eleven years. Right hand and forearm affected. Had attacks of fever about every ten days before treatment.

In this case bandaging was resorted to for two months and then discontinued. Patient continued his usual mode of life.

Measurements of arm as follows:

RIGHT ARM.

Date.	Hand.	Wrist.	Mid fore-arm.
	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>
Jan. 22, 1908.....	12	14½	17
Feb. 15, 1908.....	11½	13½	15½
Mar. 11, 1908.....	10	12½	15
Dec. 31, 1908.....	12	11	16½

Patient had for five years worn a tight leather wristlet which apparently partly prevented the swelling of the hand. He discarded this five months ago, upon which the swelling of the hand somewhat increased. Since the bandaging was discontinued the forearm has also increased somewhat in size, but still shows a distinct gain. The movements of the hand and wrist are much improved.

Patient has had only four attacks of elephantoid fever during the year, all of moderate intensity and short duration.

Case 3.—F., Samoan; female; age 44 years; has had elephantiasis fifteen years; both legs and feet affected.

Took treatment six months and was bandaged for two months, continued usual mode of life. Discontinued treatment in July; as she said her legs gave her no trouble and she was "cured of the fever."

Measurements as follows:

RIGHT LEG.

Date.	Foot.	Ankle.	Calf.
	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>
Feb. 21, 1908	11 $\frac{1}{2}$	12 $\frac{1}{2}$	17 $\frac{1}{2}$
Mar. 21, 1908	10 $\frac{1}{2}$	11 $\frac{1}{2}$	17 $\frac{1}{2}$
Apr. 18, 1908	10 $\frac{1}{2}$	11 $\frac{1}{2}$	16 $\frac{1}{2}$
Dec. 31, 1908	11	12	17 $\frac{1}{2}$

LEFT LEG.

	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>
Feb. 21, 1908	12 $\frac{1}{2}$	12 $\frac{1}{2}$	17 $\frac{1}{2}$
Mar. 21, 1908	11 $\frac{1}{2}$	12	16 $\frac{1}{2}$
Apr. 21, 1908	11 $\frac{1}{2}$	11 $\frac{1}{2}$	15 $\frac{1}{2}$
Dec. 31, 1908	11 $\frac{1}{2}$	11 $\frac{1}{2}$	16

Before beginning treatment patient had had attacks of fever at least three times monthly. She has now had no attack of fever for over three months.

Case 4.—P., Samoan; male; age 35 years; occupation, clerk. Has had elephantiasis for three and a half years. Both legs affected. Patient has been under treatment since March 10, and was bandaged until May 1, but continued usual mode of life. He has not been bandaged since May 1. Patient is a weicher of copra and on his feet a large part of each day.

Measurements as follows:

RIGHT LEG.

Date.	Foot.	Ankle.	Calf.
	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>
Mar. 10, 1908	12 $\frac{1}{2}$	12 $\frac{1}{2}$	10
Mar. 18, 1908	11	11 $\frac{1}{2}$	17 $\frac{1}{2}$
Apr. 6, 1908	11	11 $\frac{1}{2}$	16 $\frac{1}{2}$
May 28, 1908	11 $\frac{1}{2}$	11 $\frac{1}{2}$	17 $\frac{1}{2}$
Dec. 29, 1908	10 $\frac{1}{2}$	11	19

LEFT LEG.

Date.	Foot.	Ankle.	Calf.
	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>
Mar. 10, 1908	11 $\frac{1}{2}$	11 $\frac{1}{2}$	19 $\frac{1}{2}$
Mar. 18, 1908	10 $\frac{1}{2}$	11 $\frac{1}{2}$	16 $\frac{1}{2}$
Apr. 6, 1908	10 $\frac{1}{2}$	10 $\frac{1}{2}$	16 $\frac{1}{2}$
May 2, 1908	10 $\frac{1}{2}$	10 $\frac{1}{2}$	16 $\frac{1}{2}$
Dec. 29, 1908	11	11	18 $\frac{1}{2}$

Before beginning treatment patient had attacks of fever twice monthly. He has had no attack of fever since July 16. He continues under treatment.

Case 5.—O., Samoan; female; age, 29 years. Has had elephantiasis one and one-half years. Left leg affected. No bandages used.

Measurements as follows:

LEFT LEG.

Date.	Foot.	Ankle.	Calf.
	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>
Feb. 21, 1908	9 $\frac{1}{2}$	9 $\frac{1}{2}$	15
Mar. 27, 1908	9 $\frac{1}{2}$	9 $\frac{1}{2}$	14 $\frac{1}{2}$
Apr. 6, 1908	9	9	14 $\frac{1}{2}$
Dec. 31, 1908	8 $\frac{1}{2}$	9	14 $\frac{1}{2}$

Patient discontinued treatment four months ago, thinking she was well. The increase in the calf measurement on the last date is probably accounted for by the patient's general gain in weight. The leg now appears about normal as compared with the other.

Before treatment she would have an attack of fever about once a week, lasting two to three days. After beginning treatment she had for a while attacks of short duration about every three weeks. She has now had no attack of fever for four months.

A number of other cases have been treated, but for one reason or another have either not taken the treatment regularly or have only taken it for a short time.

In every case treated the patient has shown decrease in the size of the affected part within a few weeks, and the effect on the fevers is apparent even sooner.

I therefore conclude as a result of these experiments that tinctura ferri chloridi has a marked effect on the elephantoid process, decreasing the size of the affected parts and restoring function to an even greater degree. That its most marked effect, however, is on the attacks of elephantoid fever, these attacks being very markedly lessened in severity, the interval between attacks being greatly lengthened, and in several of the cases cited the attacks have apparently ceased.

In one case of prolonged elephantoid fever with very marked chyluria of three weeks' duration, the chyluria entirely disappeared

within sixty hours under the administration of tinctura ferri chloridi alone.

As far as can be judged from the number of cases treated, elephantiasis appears to be arrested by this treatment if continued for six to twelve months, and if some method can be devised in conjunction therewith to dispose of the elephantoid tissue already formed I believe a cure may be looked for. Shipments of thiosinamine and similar agents to be tried for this purpose are now en route and will be used immediately upon arrival.

I also consider it wholly within the range of probability that the widespread administration of this drug to the entire population in endemic areas might eventually eradicate the disease.

A number of experiments lasting one month were made in order to determine the effect on the number of filaria in the blood of men showing no evidence of elephantiasis.

In each case the number of filaria in a measured quantity of blood were counted weekly at 11 p. m. for two months, after which in four cases the following drugs were administered:

Tinctura ferri chloridi, 1.7 c. c., t. i. d.-----	No effect.
Liquid potassi arsenit, 2.5 c. c., t. i. d.-----	No effect.
Benzol, 1.5 c. c., t. i. d.-----	No effect.
Benzinum, 2 c. c., t. i. d. (2 weeks)-----	No effect.

A number of differential counts of the white blood corpuscles were made which showed little except an eosinophilia, which varied from 16 per cent to 40 per cent both in elephantoid cases without filaria and in filarial cases without elephantiasis.

A FEW NOTES ON SYPHILIS.

By Passed Asst. Surg. W. J. ZALESKY, U. S. Navy.

The progressive age of therapeutics has necessarily modified methods of treatment in many diseases, but the methods of treating syphilis have changed very little. Those who have read the exhaustive work of Jonathan Hutchinson on this disease can not help but note the accuracy, care, patience, and comprehension of his observations, and even up to the present time little has been added to enlighten the mind as regards the course of this disease and its manifestations. The causative factor and use of some of the newer mercurial preparations in treatment are about the only subjects that have undergone changes, and even in these the profession as a whole is ununited.

If there is any doubt in accepting the *Treponema pallidum* as the cause of this disease, the brilliant works of Schaudinn and Hoffmann, Metchnikoff, and Roux along these lines will disclose an exhaustive search for the etiological factor by these workers. If we

are to be guided by the results of their work, we must accept the treponema as the cause of syphilis. This subject of etiology is of great importance in guiding us in the treatment as well as the cause, as the opinion of writers is to begin treatment as soon as a positive diagnosis is determined. The difference of opinion as to when and what a positive diagnosis is, and at what period treatment ought to be started, are not subjects that I care to take up, leaving this to the inclination of others more skilled in argument.

The failure of workers in syphilis to find the treponema in a proper specimen is due, in my opinion, solely to poor staining and a hurried study of the microscopic field. The organism can be readily found in any proper specimen stained with any of the azur stains, such as Goldhorn's, Wright's, Jenner's, Leishman's, or Giemsa's stain.

Any of these stains properly made up and properly used will readily disclose the treponema if present in a specimen. One can not expect to find the organism in a single microscopic field or to detect it as readily as the plasmodia in a blood smear. The organism is small, usually faintly stained, and many fields may have to be studied before the treponema will be detected. Most of the failures can be attributed, however, to the stain. We must keep in mind the fact that stains deteriorate and that stains obtained from different sources will produce different results. I have noticed time and time again the various changes produced in a stained specimen in using different batches of the same stain. Even with the same ingredients and the same technique in making up a stain the picture under the microscope will vary. If a stain, then, will vary when made up by a single worker, what a variety of pictures must be produced and what a variety of results must be derived from all the different workers with the microscope. I have had what I considered an excellent Wright stain, and yet in a specimen of a mucous patch no treponema were to be found. I used a Leishman stain and had no difficulty in finding the organism. For the past year I have given up all attempts in trying to make my own stains or to work with stains produced by others but little more experienced than I in the art of stain manufacture. To make a stain is an art, and to make a stain which will always show a uniform picture under the microscope requires skill, knowledge, and practice. The most reliable stain that I have found is manufactured by a large English house. They place on the market the various stains in a precipitate tablet form, and each tablet when dissolved will make 5 or 10 c. c. of stain ready for use. With their Leishman, Wright, or Giemsa precipitate stain an excellent specimen of treponema or plasmodium can be obtained in a few minutes. Each tablet will make only a small amount of stain, so that no waste is present, and the tablets, being small, can be kept indefinitely without deterioration. The only disadvantage is that the

tablets are expensive and can not always be obtained, as they are only carried by the larger dealers in microscopical accessories.

During the past five years it has been my good fortune to study and treat a great many syphilitic cases in the primary and early secondary stages. When I graduated from the medical school I left my alma mater with the impression that the proper and most common method of treating syphilis was by a preliminary course of inunctions, followed by or in conjunction with internal medication. In actual practice, however, I soon found that the daily use of inunctions, pills, or mixed treatment soon manifested in the patient a dislike for this daily and routine medication. It has been my experience that when patients first appear for assistance and have been carefully instructed in all the important details that are conducive to good results and apparent cures, they show an overzealous willingness to aid the surgeon in combating the disease. This spirit, however, does not last long, for in the course of time the monotony and the routine of treatment which has been thorough and exact at the start soon dispel the fear of the disease in patients, who tire of devoting so much of their time to medication. To intrust these patients with enough medicine to last a week or more and to instruct them to report at frequent intervals for observation is a pernicious practice in my mind and is not the proper way for a surgeon to combat the disease. Character and determination can not be instilled in this class of patients, as these qualities are found usually to fall below par. For these reasons syphilitic patients in military services ought not be intrusted with medicating themselves. This properly is the duty of the surgeon. In civil life, with a lucrative practice and where the surroundings and facilities of the physician are such as to preclude the administration of every dose, this criticism may not apply, but the closeness of the patient to the surgeon in military practice is so obvious that the handling of these cases ought to be accurate, thorough, and persistent for the allotted time in the complete cure of this infection.

Granting that all the different methods of treatment as laid down in our leading text-books are beneficial and curative, each practitioner soon finds a preference for one method which will apply to the ordinary case, be it by fumigation, inunction, suppositories, internal medication, or by hypodermic administration. Even after the choice of the method there still looms up such a variety of forms of the drug to be used that we find a difference in the method and choice of medicant in practically every clinic and in every center. In my early experience with syphilitic cases I soon found it necessary to discard inunctions and internal medication for reasons already mentioned. During the past four years I have used the hypodermic method in administering mercury and covering this time have had

excellent results. The injections cover both the soluble and insoluble salts of mercury, and it may be well to briefly give my experience with the advantages and disadvantages that I have encountered during this period.

Mercury as used in syphilis must be absorbed by the body, as the medicinal effect depends upon the mercury ion. The body takes up the mercury in the form of an albuminate, and with the rapid assimilation of the drug medicinal effects soon manifest themselves and the response to treatment is very rapid. As the mercuric ion is very irritating, it acts upon the secretions of the kidney, liver, stomach, and intestines, and so continues until the drug is excreted. We are all familiar with the albumin in the urine of patients taking mercury and the presence of albumin after treatment has been discontinued. The excretion of the drug is prolonged (Cushny), as traces of the drug are to be found six months, and in some cases even years, after its use has been stopped.

We assume, therefore, that the curative properties of mercury in syphilis depend upon the destructive action of the mercuric ion on the syphilitic virus, and that this action can be controlled to a certain degree by the method and the amount of mercury administered, remembering that the excretion of the drug is slow and apt to cause toxic symptoms. To combat the rapid destructive syphilitic process it seems rational to use some drug that will be rapidly absorbed and that will counteract as soon as possible these destructive processes. Here hypodermic administration would be indicated, but what form of mercury can we give that can be so administered, which will be rapidly absorbed and cause little or no pain? To obtain rapidity of action, soluble salts of mercury must necessarily be used. The most common soluble salts are bichloride, biniodide, glycolate, formamide, and the succinimide of mercury. Of these the bichloride is probably the most widely used and the most painful. Used in an aqueous solution, its irritating effect is due to the mercuric and chlorine ions. The body takes it up in the form of an albuminate, but the conversion of the bichloride to the albuminate is slow, and before the surrounding cells take it up the pain caused by its irritation is so severe as to cause the patient to rebel against its use. It also has the disadvantage of being corrosive to metal and must be injected with an all-glass syringe and platinum or iridio-platinum needle. The usual dose is one-quarter grain in a freshly prepared solution administered daily or every other day.

The glycolates, formamides, and succinimides are soluble in water but have the disadvantage of being rather hard to obtain just when needed. The succinimide represents this group and is the one most commonly used. These drugs belong to the amido group and mercury having a strong affinity for the amido group, has little tendency to

precipitate the proteids. For this reason the use of mercury in this form is said to be attended with little or no pain. But pain is present after any of this group has been injected, being due to the dissociation of the mercury-amido group and the conversion into an albuminate. The conversion probably is slower and less active than with the bichloride and so the irritation is less with the succinimide group. There is no doubt that they will cause pain as any one using them will soon discover, and the induration of the tissues produced by the frequent administration of the succinimide is so great that new regions for injections must be selected to carry out a constant course of treatment by this drug. In cases of persistent mucous patches and paronychia the succinimide is a very valuable drug, as it clears these lesions up where other forms of mercury fail. This may be due in part to the large per cent of metallic mercury contained in it and also to the uniform conversion of the mercuric ion by the body, which seems to be more constant and regular than with most of the salts of mercury.

Biniodide of mercury has long enjoyed a prominent position in the treatment of syphilis, being usually prescribed in the mixed treatment. It is readily soluble in water with a slight excess of potassium iodide, is easy to obtain, and is taken up by the body more readily than the bichloride. When injected into the deep muscles, in an aqueous solution, it causes a great deal of pain, and this is its main disadvantage. To overcome the irritation produced by the drug in an aqueous solution, I have, for the past six months, been using a solution of biniodide of mercury in sterile oil in the strength of 2 per cent, injecting from 10 to 20 minims of this daily or every other day according to the case. My attention was first called to this form of drug by numerous advertisements of mercuol, cypridol, syphidol, etc., which the manufacturers claim to be a 1 per cent solution of mercuric iodide in oil. Dr. Joseph Hume, of New Orleans, in using mercuol doubted the strength of the solution and could see no benefit under its use. Chemical analysis of many of these preparations placed on the market show them to be frauds, as only slight traces of mercury were found upon analysis. In discussing this with Doctor Hume it struck us very forcibly that a solution of biniodide of mercury in an oil would be an excellent way of overcoming the irritations produced by aqueous solutions and yet be rapidly absorbed.

Last fall I carried out a series of experiments in attempting to obtain a solution of mercuric iodide in oil and found it a very simple process, providing a little potassium iodide was added to assist in the solution. My first experiments were with a 1 per cent solution, but for general use this strength was found too weak, as the amount

of drug contained in 10 minims would be only one-tenth grain. A 2 per cent solution was desired and the following formula was derived which produced a clear, stable, oily solution, which, upon injection, caused practically no pain and which was of therapeutical value and easy of administration:

Mercuric iodide	2.0
Kallum iodide	0.5
Cotton seed oil	100.0

The oil used as a menstrum is of great importance. At first mineral oils were used, but the biniodide recrystallized in a few weeks. Vegetable oils were found to be the best and appear to be more readily taken up by the body. Whether this is a true solution of mercuric iodide in oil or if the mercuric iodide has been changed to a mercuric-potassic iodide I do not know, but the fact remains that the amount of mercury is constant and upon mercury depends the value of the solution. The formula above calls for a 2 per cent solution, and as 10 minims of the oil are usually injected, this would equal one-fifth grain of biniodide per dose. I have used this solution in this strength for the past six months, administering it daily or every other day, according to the case. The solution can be used with any syringe or needle, as it is noncorrosive, is practically painless, causes little or no induration, and acts rapidly upon the destructive virus of the disease.

The use of soluble salts of mercury, however, have the great disadvantage of requiring frequent administration. The preparations must be used daily or every other day, and when given hypodermatically necessarily require care and asepsis on the part of the surgeon. The advantage of the soluble salts is that they act rapidly upon the syphilitic virus. They are of particular benefit in the early stages of syphilis, when our method of attack ought to be one of careful and vigorous medication.

This can best be done by a systematic administration of mercury by intramuscular injection, where a known quantity of the drug is injected at regular periods and where the patient is charged with a sufficient amount of the drug to overpower the infection. Patients do not object to receiving frequent injections; it does not appear to be as irksome or depressing as the use of pills or inunctions. The patient is under the constant observation of the surgeon, and consequently under a more rigid and thorough treatment than if the medication was intrusted to him. In two or three months the disease will have been checked in its progress and can be kept under control by the less energetic insoluble salts which now can be used. Unless persistent and thorough treatment is carried out during the first few months of the infection, the value of mercury in syphilis is lost. The success of a

cure depends in most cases upon the initial months, which Taylor explains so well in the following:

This, then, is the most favorable time for efficient treatment as it is the most critical one in the life of a syphilitic, for if the disease is actively attacked then its backbone may be broken. It is very possible that much of the late rebelliousness and malignity of syphilis is due to the fact that the newly formed infecting granulation cells and the concomitant subacute inflammation induces in organs and tissues, particularly delicate ones, structural and nutritive changes which predispose them to subsequent low grades of inflammation and cell increase; besides, to a repetition of the essential syphilitic process. Therefore every effort should be made to destroy these young infectious cells and to remove them as quickly as possible from the parenchyma of organs and tissues before they have had time to induce these subtle and dangerous structural changes. In proportion as a systematic and vigorous mercurial course is entered upon late, so it is less effectual in its action.

After the system is well mercurialized with the soluble salts these can be discontinued and the insoluble salts used, which require administration every five to ten days. The solution of the insoluble salts by the tissues being slow, their absorption covers a period of several days. The most commonly used insoluble salts of mercury are calomel in oil, some of the oxides, benzoate, thymol-acetate, and the salicylate, besides gray oil. I have had no experience with any of these except the salicylate, using this in all of my syphilitic work in the strength of a 20 per cent solution, administering from 10 to 20 minims of this every fifth, seventh, or ninth day. There is little discomfort to the patient in using salicylate in this way, and practically no pain at time of injection. Occasionally the induration in glutel muscles lasts a week or more as if the injection had become incysted, but this always disappears. After the fourth month it is a simple matter to treat syphilitic cases and little trouble to both patient and surgeon. Lately there have been a few deaths reported in patients who had been treated with salicylate of mercury in oil, and death resulting six weeks or more after treatments were discontinued. These deaths were attributed to an acute mercurial intoxication, the patients all showing ptialism, stomatitis, enteritis, myocarditis—in fact, all the symptoms of acute mercurial poisoning. So far only a few reports of this nature have been made and all originated in France. This danger would not appear so great when it is considered that salicylate of mercury is used very extensively in this country and is indorsed by almost all who have tried it. The possibilities of death are to be considered in any form of treatment, and it is wise to be cautious and careful in administering any form of mercury.

One may think that the management of a syphilitic case by hypodermic injections is too complicated, dangerous, and impracticable; but this is not so. To go into all the points of technique would be too lengthy a discussion, but the following points may be pertinent to the subject: Good drugs, good syringes, and ordinary aseptic

precautions make the work neat and interesting, take little time, and give excellent results. It takes about a minute to give a patient an injection, and this time can be cut down by dexterity in manipulation which will be gained after giving a few injections. For the syringe a Luer or, in fact, any carefully graduated all-glass syringe with platinum or iridio-platinum needle is most suitable. Such a needle will not corrode, can be sterilized in a flame, is sharp and of good caliber, and admits a good flow of oil. One of about $1\frac{1}{4}$ to $1\frac{1}{2}$ inches in length will answer for any case.

The site of the injection used is the buttock, although any part of the body which is muscular can be used. The buttock, however, is accessible, and extensive enough to permit of several injections on either side.

Ordinary aseptic precautions for any hypodermic injection are to be observed, and the field can be readily prepared by a trained assistant in a few moments. With care the possibility of infection is remote. I have given hundreds of injections and have never had a single infection. Care must be taken, however, not to inject the drug into a vein, and this can be guarded against by detaching the syringe after inserting the needle, to see if any blood oozes; in case it does, withdraw the needle and reinsert.

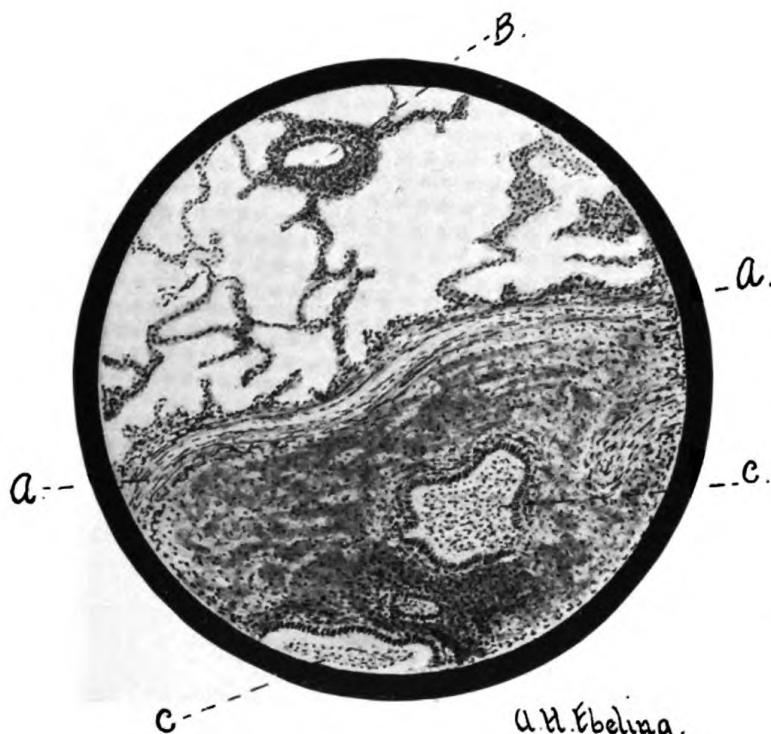
There still remains one other point of great importance in military practice, and a point that should always be observed. I refer to records which ought to be made in every case on the enlistment record. If this point was carefully carried out the treatment of syphilis in military practice would be complete. In case of transfer of a luetic from station to station a history of the case, time, and course of treatment ought to be noted so that the surgeon can promptly continue the treatment under his supervision. A simple notation of "syphilis" on the health record means little to a surgeon when the patient is reluctant to give the desired information. Medical officers ought to take as much interest in treating syphilis the second and third year as in its initial stage, and this can not be done unless proper notes are recorded in every case of transfer.

A NOTE ON THE PATHOLOGY OF EPIDEMIC ASTHMA.

By Passed Asst. Surg. O. J. MINK, U. S. Navy.

Epidemic asthma as seen in Guam presents the following features:

1. Scattered cases are present at all times, but widespread epidemics appear suddenly in the twenty-four to forty-eight hours following rainy, cold weather.
2. All ages are affected, but most of the cases are in children and young adults.



A. H. Ebeling.
6-10-09.

SECTION OF LUNG—EPIDEMIC ASTHMA.

- a. Connective tissue border of lobules. Atelectatic lobule below, emphysematous lobule above.
- b. Bronchiole patent, but showing small round cell infiltration of wall.
- c. Bronchioles showing lumen tightly plugged with mucus containing a few cells.

3. The patients complain of difficulty in breathing. On examination we note a very severe dyspnœa. Auscultation reveals widespread high-pitched whistling râles. Rarely the temperature is elevated 1° or 2°.

4. Expectorants, combined with whisky, atropine, and opium, relieve the dyspnœa permanently, but the râles persist for some time.

5. Repeated attacks cause an emphysematous chest and more or less constant dyspnœa. Typical acute attacks recur in bad weather.

6. The mortality is slight and affects principally old, feeble individuals and poorly nourished or very fat babies. Death is apparently due to acute dilation and engorgement of the heart.

Pathology.—The bronchi and bronchioles contain a thick tenacious mucus. The cut surface of the lung shows red spots varying from pea to egg size. Under the microscope these areas, which embrace a lobule or groups of lobules, are found to be atelectatic. The remainder of the lung shows compensatory emphysema. The walls of all the bronchioles are thickened and infiltrated with round cells indicating a bronchitis. In the atelectatic lobules the bronchioles are completely plugged with a thick mucus containing a few cells and the corresponding alveoli are collapsed and air free.

We find therefore a primary exudative bronchitis. Exposure to bad weather increases the exudate, which completely plugs many of the bronchioles and renders atelectatic and useless, for the time, the lobules supplied by these bronchioles. The degree of dyspnœa varies according to the amount of lung made functionless and the ability of the remaining lung to compensate for the defect. The dyspnœa and the increased resistance to the flow of blood in the lung overtaxes the heart, and may be followed by dilatation and death. Atropine dilates the bronchioles, expectorants remove the obstruction in the bronchioles, opium relieves the pain, and the sufferer says he is well, but the râles persist because the bronchitis is still present. Fever is absent or slight, because the only lesion is the exudative bronchitis.

This is the typical pathologic picture, but the symptoms and the prognosis may be varied by the presence of tuberculosis, pleurisy, and pneumonia.

REPORT ON SIXTEEN CASES OF HEAT PROSTRATION, WITH REMARKS ON ETIOLOGY.

(From the U. S. S. *Kentucky*.)

By Surg. A. G. GRUNWELL, U. S. Navy.

In reporting, in accordance with the bureau's memorandum of May 27, 1908, 11 cases admitted on the Medical Journal of this ship as "prostratio thermica," I must state at the outset that, for many

reasons, it has been impossible to classify the symptoms, or to examine minutely into them, as suggested in the memorandum. That such systematic analysis of the condition known as heat prostration could not have been accomplished is very regrettable, but the conditions of service and lack of physiological and chemical means of investigation have made it beyond performance.

It is quite possible that some of the 11 cases here reported should not be classified as instances of pure heat exhaustion, and indeed there is but one case in my series which presented a line of symptoms in all respects typical. For that reason this case only will be reported in detail. The symptoms prominent in the remaining 10, as a class, will be enumerated together.

Often, in making a diagnosis, many things had to be considered, such as exposure, time of attack, the system to which symptoms were mainly referable, and the exclusion of other causes for them. For instance, the first case in the series, that of a first-class fireman, suddenly developed December 31, 1907, while the victim was on duty in the fire room, with intense headache, vertigo, and disturbances of vision. There was no rise of temperature, and after two days, his symptoms having disappeared, he returned to duty. This case is a type of a number of those reported, and if to the list of symptoms manifested by him be added a slight rise in temperature (99° to 101° F.) or a slightly subnormal temperature, tinnitus aurium, vomiting, abdominal and muscular spasms (seldom amounting to tetany), increased nervous excitability, and prostration, more or less severe, the list is about covered. The pulse gave no distinctive information. It was sometimes considerably above the normal in rapidity; sometimes a little slower than normal; and was usually less full and strong than normal. The blood pressure could not be measured. In the majority of cases the urine was examined for albumen and sugar, none ever being found. The blood examinations for parasites were negative.

It is not improbable that had some of these men failed to find prompt relief, or had the exciting causes to which they were exposed continued in operation, they would have developed graver and more typical manifestations. This is partly illustrated in one man who had a severe attack, he having suffered a mild collapse in his morning watch, and, ignoring the warning, returned to duty in his regular evening watch the same day, with the result that his life was nearly forfeited to his zeal.

Save the first instance of heat exhaustion, which occurred December 31, 1907, near Trinidad, there were no other examples of it until the following July, when the man above referred to as having a grave attack, Weston, coal passer, was stricken at Honolulu. Fol-

lowing him there were nine other men taken, all within the month of July, since which time there have been no others.

Practically all of these latter cases occurred on the run between Honolulu and Auckland, New Zealand, when the tropical heat was made even more intense and the confined air more or less foul by the necessity of keeping the deck hatches closed, because of the constant rough weather encountered on the trip. It is also true that, in addition to the fact that the weather was uniformly good during the run from Hampton Roads to San Francisco, the men then in the fireroom force were nearly all seasoned men. At San Francisco the places of many of them were taken by recruits. The instances of heat exhaustion, so called, were, however, not confined to the men of the fireroom, cooks and men on deck being also included in the list.

The account of Weston's case, above referred to, is here quoted from the ship's medical journal, under date of July 21, 1908:

At about 11.30 p. m. he was overcome in the fireroom by the heat, and was with difficulty brought up onto the quarter-deck on a stretcher. When first seen in the fireroom he was totally unconscious and was suffering repeated epileptiform seizures, with stertorous breathing, protrusion of the tongue, pulse 130 to 140. On deck, he promptly partially revived, and then it was noticed that aphasia was practically complete, though he indicated his desire for water by pointing to his mouth and his protruding tongue. After being brought on deck he suffered three more convulsive attacks, each one milder and shorter than the preceding. During the attacks the pulse would rapidly advance to 110 or 120 beats per minute and would become almost imperceptible at the wrist; but as the attack passed off the volume of the pulse would be rapidly recovered, and the number of beats would slow down to 90 or 100. The axillary temperature was found to be 95° F. There was nothing characteristic about the convulsions, they being practically similar to those produced by general cerebral irritation from other causes, and, though no fibrillary twitching could be made out between the convulsive seizures, there was present a distinct muscular tremor, as evidenced by grasping the hand. Pupils evenly dilated. Rigidity persisted after the convulsions had subsided. * * * By 12.50 a. m. the last convulsion had showed itself, the temperature had gone up to 98, the pulse was 90, respirations 26, and he was able to say a few words in a whisper. A little water given him in response to his pleadings was promptly ejected and with it a quantity of food showing no signs of the slightest digestive changes.

There was no obtainable incident in his history, prior to entering the navy which would have operated to create a predisposition to the attack just described.

A condition noticed in nearly every one of these men and in the great majority of all other instances of heat exhaustion which I have seen may throw some light on the subject, and possibly furnish the clew whereby our present limited knowledge of the complaint may be extended. It was found that the health of nearly all of these men had been noticeably slightly below par for a longer or shorter

period prior to the attack. The disturbances were always gastro-intestinal, and examination after or during the attack practically always revealed the presence of gastro-enteritis of varying degrees of severity. The urine was variably high colored, as is seen in gastro-hepatic diseases. This I believe to be significant, for with the recent studies in auto-intoxication as affecting the eye; with the conclusive proof that certain forms of disease of that organ depend solely upon the presence of fermentative processes in the digestive organs, it seems not unreasonable to look to the same cause for some obscure forms of disease in other organs or systems. More and more attention is being paid by the profession to this cause for hitherto vaguely understood "functional" diseases, and the results of investigation at least point the way to further research in the same field. If toxæmia can cause well-pronounced pathological changes in the eye, why not in other delicate organs also? It would not be surprising to find Menière's disease, for instance, finally attributed to this cause.

There are many who have long believed that something more than exposure to a high temperature is necessary to produce heat prostration. What this may be is, so far, a matter of conjecture. But the facts, certainly in some cases, seem to warrant the assumption that heat alone can not, or does not, produce these effects in the healthy body.

It seems not unreasonable if we believe that under certain circumstances quantities of an intense poison, whether always the same kind or of more than one kind, is absorbed from the alimentary canal, where it is being produced by bacterial activity. That the continued circulation of this substance in the blood can cause very profound changes in the vitality and resistance of the nervous tissues; that under certain circumstances, as exposure to sultry heat, over exertion in high temperatures, the sudden checkage of perspiration, the diminution of the quantity of water in the blood, or the sudden interference with the absorbing function of the intestines, this poison may produce, on the nervous system, a profound stimulating or a profound depressing effect, sometimes accompanied by abnormally high temperatures and sometimes abnormally low ones, together with all the evidences of cerebro-spinal irritation so noticeable in the clinical picture of the disease under consideration.

During the run of the fleet from Albany, West Australia, to Manila, P. I., including the day after the fleet's arrival at Manila (October 3), and since the above was written, five additional instances of heat prostration (two firemen, two coal passers, and one marine) have occurred on board this ship, the report of which is here included. In four of these the symptoms were practically identical with those of the mild cases reported above, except that a history of previous

gastro-intestinal disturbance could not be so clearly made out. The urine, however, showed the usual high color found in the first group of cases.

In the early morning of October 3, while the ship was coaling, it being quite hot, there occurred probably the most interesting case of the whole series. At about 6.30 a. m., coaling having started at 5 a. m., O. Hargo, a private marine, Norwegian by birth, and a large, powerful, and apparently healthy man of 22 years, was suddenly stricken while wheeling coal on deck with vertigo and violent headache. He was carried up on the bridge in the open air, and when he was seen a few minutes later convulsive twitchings had commenced. These increased rapidly in severity, becoming general tonic spasms, and were in all respects so similar to the spasms of tetanus that, except for the etiology and the absence of wounds or the history of any, a diagnosis of that disease would have been made without hesitation.

When fully established, the spasms seemed always to begin in the face, spreading in regular order to neck and chest, and then becoming general. Often this succession would occur with great rapidity, though sometimes risus sardonicus, and the occurrence of intermittent spasmodic contractures of the pectorals and diaphragm, would give warning of the approach of a general tetanic seizure. As improvement set in the spasms also abated in regular order, risus and the twitching of the pectorals being the last to disappear. During the height of the seizures the spasms were very painful, and a marked tendency to opisthotonus was shown. There was, also, double convergent squint, the pupils being evenly, moderately contracted. Headache was excruciating and consciousness was never lost, though he became decidedly somnolent at times, probably from the effects of the morphine and chloroform administered to control spasms. Throughout the day the pulse was full, strong, and regular, ranging from 60 to 74 beats per minute, and the temperature never rose above 100° F., either by axilla or by mouth. Once only did vomiting occur, and then in the evening, after the administration of a small quantity of water, in spite of the fact that small quantities of not very cold water had been given from time to time during the day and retained. The tongue was slightly coated.

It was very noticeable that currents of air, a touch, sudden noises, etc., were liable to, and usually did, produce a spasm, as in tetanus. The convulsions were readily controlled by a few inhalations of chloroform, after the administration of morphine.

During the afternoon, the convulsions gradually subsiding, the patient passed a comparatively quiet night, without spasms and with considerable sleep. The next morning he complained of pain in his jaws, which were a little swollen, and of toothache and headache.

He was left in the open air during the night, but with the morning a steady rain set in, necessitating his removal below to the sick bay, where it was close and hot. Shortly after his removal to the sick bay slight spasms reappeared, upon which he was quickly transferred ashore to the naval hospital at Canacao, P. I., it being impossible to find a cool, quiet place for him on board.

At the time of this man's attack, 7 a. m., the temperature in the open air, where he was at work, was only 82, but the atmosphere was very humid. This was particularly the case during the preceding night, October 2, while in the afternoon and night of the day following his seizure, October 4, a heavy typhoon raged about Manila. The temperature to which the above-mentioned firemen and coal passers were exposed when experiencing their comparatively mild seizures ranged from 135° to 165° F.

To the writer it does not seem possible that heat, unaided, could produce such a train of symptoms as enumerated above. Otherwise, why should they not occur with great frequency, instead of with comparative rarity, and practically never in cases of acute high fever—malarial intermittent, for instance, where the rise in temperature is often both sudden and excessive? It will be seen that in none of my cases was the bodily temperature at all high, contrary to that of many reported cases of heat prostration. In a number of mine, as in numerous others reported, it has been subnormal. Neither does the degree of the external temperature, or the length of time of exposure to it, seem to afford any explanation whatsoever, for many persons succumb to a comparatively low temperature, whereas others withstand indefinitely an exceedingly high one. While the actual temperature in this ship's firerooms during very hot weather was 135° to 165°, there were comparatively few instances of prostration, and these mostly mild cases among the men constantly employed there. The dynamo rooms were almost equally hot, but no electricians were overcome. These facts, associated with the development of this condition, are widely and freakishly at variance with the wonderful capacity of the healthy body to maintain its normal temperature in an environment of almost any degree of heat or cold.

EDITORIAL NOTE—In seeking to frame some explanation for the varied type and severity of the symptom complex which is indicative of "heat exhaustion" the author has reasoned upon his clinical observations and developed the hypothesis which is presented below, with comment and conclusions. He does so in the full realization that unsupported hypotheses are far from convincing in this age of exact scientific requirement and in the knowledge also that it is the accepted belief that under normal conditions the toxin is digested or otherwise destroyed by the alimentary canal juices, and infection by that atrium is improbable. He believes, however, that the idea may be worth something as a suggestion and deserving of more thorough investigation in the study of this little-known condition. Moreover, "from a careful clinical analysis of the

reported cases, and others which have come under observation, and from a study of the disease as usually described," he believes the hypothesis is susceptible of experimental demonstration. In submitting the report Doctor Grunwell expresses the hope that a careful investigation of the subject, along the lines indicated in his report, may be undertaken in the laboratories of the Naval Medical School. He says:

We know of two types of poisons which are capable of producing symptoms in many respects similar to those described above. One, the toxin produced by the tetanus bacillus; the other a group of drugs of which strychnine is representative. Can it be that there are others, similar in nature; or is it that one of these, the first named possibly, acting in a way not as yet understood, produces these manifestations? From what we know of tetanus with the bacilli growing in the tissues of the body where they have been placed by inoculation, the course of the disease is progressive, and usually terminates fatally; while in these, and other cases, we see that with proper care recovery is to be expected, except in certain very bad types. May not this difference be accounted for by the actual growth in the tissues themselves on the one hand, as contrary to absorption of products *only* on the other? Such an hypothesis would readily explain the difference in intensity of symptoms from those cases which rapidly reach a fatal termination to those merely suffering vertigo, headache, and a few spasms.

The intestine of the horse, I believe, is now considered to be the natural habitat of the tetanus bacillus. This being so does not preclude the possibility of this organism inhabiting, at times at least, the intestinal tract of other animals as well, man included. As a matter of fact it is rather suggestive that such may be the case. The horse is very prone to both tetanus and "sun stroke." In this connection it may be interesting to state that on October 3, shortly after private Hargo was stricken, the ship's pet black bear, a small, vigorous, playful cub, while lying on the berth deck, just outside of the sick bay door, panting, suddenly stiffened out with tetanic convulsions and expired almost immediately upon being taken on deck into the fresh air. The temperature in the sick bay at that time was 94° F.

Although, from my imperfect descriptions, the points of resemblance in the above reported cases may not be so apparent to the reader, to the writer their similarity is very evident, the mildest with the severest, when the nature of the manifestations, rather than their degrees of severity, are considered. It is especially so in the two severe cases, the first having rapidly progressed to the stage of collapse, while the second approached it gradually, improvement setting in before he reached it.

On January 16, 1909, Surgeon Grunwell submitted the following addenda to the above report:

* * * I had the honor to forward from Manila, P. I., on October 7, 1908, a report on 16 cases of heat prostration, in which I advanced the hypothesis that this disease was not improbably caused by the tetanus bacillus, or a similar, unknown organism, developing under certain influences in the intestinal canal, and that the train of symptoms, constituting what we designate as "heat prostration," was a series of phenomena incident to the absorption under certain conditions from the intestines of a toxic substance produced by the growth of such an organism in that locality.

At that time I was not aware that the tetanus bacillus had been found inhabiting the human intestinal canal, though I firmly believed that it could and did exist there under certain conditions. In this connection, I invite reference to the "Journal of the American Medical Association," November 2, 1907,

containing on page 1531 an editorial entitled "Tetanus Bacilli in the Human Intestine," which not only states definitely that the tetanus bacillus has been found on several occasions in the human intestine, but which I believe seems also to give some color of confirmation to my hypothesis as to the cause of heat prostration, as ordinarily observed.

Looking to the time when it may be possible to investigate this question, I would like to state again in more precise form my personal conclusions, from purely clinical evidence, of the condition known as heat prostration, as follows:

First. That this whole class of cases can be divided into three groups: (a) A group, very rarely seen as heat prostration in medical practice, in which the victim is exposed to intense heat, as are persons caught in burning buildings, where the symptoms to be expected would be somnolence, coma, and death—a mechanical influence analogous to, though the opposite of freezing. These cases, when rescued, would be treated for actual burns and shock rather than for heat prostration. (b) A large group, improperly diagnosed, in which the exposure to heat rapidly brings some preexisting disease in certain individuals to a crisis. (c) The group with which we are concerned—those suffering with "heat prostration" or "heat exhaustion," so called, and in which convulsive seizures, twitchings, or other more or less profound nervous symptoms are present.

Second. That heat, per se, acts as a causative agent in this disease in a manner analogous to cold in pneumonia. That it acts probably by interfering with the normal secretions of the liver, stomach, and intestine, and possibly by causing at the same time rapid absorption from the alimentary canal. Probably, also, exposure to hot and humid states of weather has a more indirect influence, as by tending to retard body metabolism; while the concomitant depression of the normal antibacterial powers of the intestinal mucous membrane and juices favors the rapid growth and pathological activity of resident organisms.

Third. That if the train of symptoms observed in these cases is not caused by the absorption from the intestinal canal of toxic substances produced by the growth of the tetanus bacillus therein, it is caused by the absorption of some very similar poison. My conviction is that we need look no further than the tetanus bacillus for the production of the poison.

Fourth, that under certain abnormal conditions of body metabolism, as produced by excessive heat, this (the tetanus) bacillus, instead of being destroyed or having its growth inhibited after gaining entry to the alimentary canal, flourishes, producing in its development its usual toxin which, not being at the time digested or otherwise destroyed, is absorbed with greater or less rapidity, and gives origin to the symptoms observed.

Fifth, that the intensity and duration of the symptoms depends directly upon either the rapidity of the growth of the bacilli in the intestine or the rapidity of absorption of the undestroyed toxin there.

Sixth, that other animals, certainly horses and bears, are liable to a similar disease, and that horses harboring tetanus bacilli are habitually especially prone to attacks of "sunstroke."

Seventh, as recovery, certainly in a great majority of these cases, is to be expected, and as death is the most frequent termination of tetanus developing in the usual way by inoculation, this condition is believed to be the result of absorption of toxin rather than the growth of bacilli in the tissues themselves.

REVIEWS.

(Three papers.)

LIVER ABSCESS, FROM THE POINT OF VIEW OF ETIOLOGY AND PROPHYLAXIS; PATHOLOGY AND DIFFERENTIAL DIAGNOSIS; AND TREATMENT.

The review of this subject from the several aspects indicated above is presented in the following papers, which were prepared by student officers under instruction at the Naval Medical School and read at the final symposium of the winter course at that institution, March 2, 1909.

THE ETIOLOGY AND PROPHYLAXIS OF LIVER ABSCESS.

By Assist. Surg. GEORGE B. CROW, U. S. Navy.

1. Davidson, Tropical Diseases. Allbutt's system of Med., 1908, Vol. II, pp. 581, 587.
2. Rogers, British Medical Journal, No. 2, 1902, p. 844.
3. Musgrave and Clegg, Philippine Jour. Sc. 1906, pp. 909-950.
4. Musgrave, Philippine Jour. Sc. No. 5, 1906, p. 552.
5. Diamond, Philadelphia Med. Jour., Apr. 7, 1907, p. 819.
6. Rogers, Philippine Jour. Sc. No. 4, 1908, p. 285.

The agents and conditions which may give rise to abscess of the liver are numerous. Such suppuration may occur in pyæmia; it may follow many of the infectious diseases; it may be induced by the invasion of the liver by echinococci, flukes, ascaris lumbricoides, *Balantidium coli*, and by other intestinal parasites.

But by far the greater number of cases belong to a type of the disease peculiar to warm climates, and this type is to be here considered.

In 1887 Kartulis in Alexandria described the occurrence, in the contents of an hepatic abscess, of living amœbæ which he considered identical with organisms he had previously found in the walls of dysenteric ulcers. Numerous similar observations were made from time to time after this, and the reports of recent years indicate that amœbæ, alone or with bacteria, are present in the vast majority of liver abscesses.

Autopsies in cases of amœbæc dysentery show that an average of about 20 per cent is complicated by liver abscess. If the nonfatal cases were considered, the total average would probably not exceed 10 per cent.

Of still greater importance is the frequency with which liver abscess is preceded or accompanied by dysentery. Davidson tabulates 2,300 cases reported by some of the best observers in different countries, and over 70 per cent of these were associated with dysentery or intestinal ulceration.

Liver abscess in bacillary dysentery is rare. Major Buchanan found it only once in 681 cases in the prison dysentery of India, and in the dysentery of wars it is equally uncommon.

The bacteria that occur with amœbæ in tropical abscess are in general such as may be found in a normal colon, and include staphylococci, streptococci, the colon bacillus, and sometimes *B. pyocyaneus*. Kruse and Pasquale consider that none of the bacteria present are sufficiently constant to be considered specific, although all of them may possess pathogenic properties. Kartulis believes that amœbæ play the principal part in the production of lesions; that they serve as vehicles for bacteria; that they cause rupture of the capillaries; and that the bacteria with them are the pus producers. Councilman and Lafleur believe with Rogers that amœbæ alone are the active agents in the production of liver abscess. The former never found bacteria numerous, and the lesions were of a different character from those produced by bacteria.

Schaudinn, whose work has been confirmed by Craig, established for the amœbæ of the intestine the genus *Entamœba* and described two species, viz, the *E. coli*, which he considers harmless, and the *E. histolytica*, which he considers pathogenic. Musgrave, Clegg, and Strong question the justification for such division into pathogenic and nonpathogenic species. Space does not permit a rehearsal here of the work on which these adverse views are based, but, as the work of Musgrave and Clegg seems to shed some light on the rôle of amœbæ and bacteria in the production of liver abscess, some of their findings will be given.

They found that amœbæ, outside of certain locations in the human or animal body, are always associated with other microorganisms, and their experiments demonstrate that a more or less definite symbiosis exists between the amœbæ and some one or more of these organisms (usually bacteria). For example, if cultures are made of all the different organisms found in a body of water which contains, let us say, the usual assortment of amœbæ and bacteria, amœbæ from the original source will, it will be found, grow well in some of these cultures, poorly in others, and not at all in the remainder.

If this experiment is repeated several times with the same cultures from the same water, it is found that divers bacteria grow from the best cultures at different times, indicating that the symbiosis is a changing one. In their work with cultures they found that symbiosis could be changed from organism to organism at will, provided the changes were made gradually, and that an amœba could be made to grow with an organism which at first had sufficient antagonism to destroy it. They also found that if an amœba taken from any source and cultivated in pure species with bacteria

was fed, together with its symbiotic organism, to monkeys or to man, under certain conditions amœbic infection of the colon would result. If such mixed cultures were injected into the livers of monkeys, abscesses would result in a certain percentage of cases. This was also true when bacteria, which alone would not produce liver abscess, were used in symbiosis. By continuing this inoculation from animal to animal it was found that the bacteria became fewer and fewer and finally abscesses were produced containing only amœbæ. Now, by further continuing this trans-inoculation, the percentage of cases in which abscess would develop gradually diminished, and finally the injection of amœbæ from an abscess would no longer produce an abscess.

From the results of their experiments they conclude that in the tissues bacteria are for a time necessary to the growth of the amœbæ; that in the dysenteric ulcer a partial symbiosis with the tissue cells has been established, and that in the liver the symbiosis with bacteria may be entirely replaced by one with the liver cells; in other words, the amœbæ in the liver becomes a strict parasite. They are unable to explain why this parasitism can not be continued indefinitely, but suggest that it may be due to the wide difference between this highly specialized parasitic symbiosis and the natural saprophytic symbiosis of the amœba.

The manner in which amœbæ reach the liver is still somewhat in doubt. It would appear improbable that they go by way of the bile ducts, because undiluted bile is toxic for amœbæ. They do at times show a tendency to wander in the tissues, and Musgrave believes that in some cases of the large single abscess, especially where adhesions exist between the liver and colon, there is a strong probability that the route has been directly through the tissues. But the evidence is fairly conclusive that in most cases the portal circulation acts as the means of transmission. Amœbæ have frequently been seen, often in great numbers, in the blood vessels contiguous to the intestinal lesions, and Musgrave says that where the lesions were extensive this was a constant finding. They may also be found in the blood vessels at considerable distances from the macroscopic lesions. In addition, Councilman and Lafleur have found amœbæ in emboli in the portal veins, and Musgrave found this true in two cases, neither of which showed liver abscess.

It appears, then, that in advanced cases of intestinal infection amœbæ must almost constantly be poured into the liver. If this is so, the mere presence of the amœbæ is not sufficient to produce liver infection, and whether or not a case of amœbic dysentery will be complicated by abscess of the liver must depend largely upon the condition of the liver itself.

At this point let us consider, in a general way, the distribution of the disease.

(a) Amœbic dysentery is uncommon in the northern and central parts of the United States and of Europe, but liver abscess is still less common.

(b) Tropical abscess is most prevalent in those warm countries that are subject to sudden and wide fluctuations in temperature.

(c) It occurs twenty times more frequently among Americans and Europeans in the Tropics than it does among the natives, although it appears that dysentery is equally common among natives and foreigners.

What is the significance of these facts?

The individual going from a temperate to a tropical climate is subject to physiological changes which affect the entire organism. Just how heat affects the body is not understood, but it is certain that the white man in the Tropics is more susceptible to pathological risks than is the native. These changes in physiological activity are especially marked in the liver and many things, which in temperate climates produced no ill effects on the liver, here tend to pathological changes. A diet unsuited to the climate and the habits of the individual throws increased work upon this organ particularly, and in time renders it inefficient. Alcohol produces functional and structural changes more constantly than in cold climates. Malaria, by the production of toxic material and by the congestion brought about in the liver with every paroxysm, may aid in lowering its vitality. A quick fall in temperature may bring on congestion and even hepatitis; and from the findings of Diamond it appears that the continued absorption of amœbic toxins from the bowel will bring about degenerative changes in the liver.

These factors, acting in partial or complete combination, produce in the liver a condition of lowered resistance with the result that pathogenic agents, which in the healthy condition of the organ were harmless, finally bring about destructive changes with the formation of abscess.

Prophylaxis.—To prevent liver abscess eliminate the factors concerned in its production. Try to maintain a high degree of general body resistance by observing the general principles of hygiene and by adopting habits of life suited to the new environment.

Guard against dysenteric infection by using only food that has been recently cooked and water that has been recently boiled. In carrying out precautions relative to food and water care should be observed that they be characterized by thoroughness and consistency, e. g., that boiled water be used in the toilet of the teeth and that both food and water be protected from contamination by insects, etc.

If amœbic dysentery should develop, prompt and vigorous treatment is called for.

All those factors that tend to produce an inefficient liver should so far as possible be eliminated. No more food should be eaten than is necessary for the body needs; alcohol should be taken in moderation, if at all; and in those climates subject to sudden fluctuations in temperature such clothing should be worn as will most efficiently prevent chilling of the body.

Some reference should here be made to the treatment of those cases in which hepatitis has developed and suppuration seems imminent.

Rogers, after several years experience, believes that ipecac, given in 30-grain doses once a day for several days, is a specific in the presupplicative stage of hepatitis. In the last two years of this treatment in the European General Hospital, Calcutta, not a single case of abscess has developed, and in five of his cases abscess was so strongly suspected that the liver was aspirated before the ipecac treatment was begun.

These latter cases would probably be thrown out by Cantlie and Harley, who believe that hepatic phlebotomy is in itself of proved value in the treatment of this stage of hepatitis.

To sum up briefly, it seems from present knowledge that in nearly all cases of tropical liver abscess, however bacteria may modify its character, amœbæ are the exciting cause, but that they are incapable of producing abscess so long as the liver remains healthy; and that the rational prophylaxis is the prevention of amœbic dysentery and the maintenance of a high degree of liver efficiency.

THE PATHOLOGY AND DIFFERENTIAL DIAGNOSIS OF LIVER ABSCESS.

By Asst. Surg. J. A. B. SINCLAIR, U. S. Navy.

1. Sachs, Arch. Klin. Chir., xix, p. 235.
2. Strong, Amœbic Dysentery, Osler's Mod. Med., 1907, Vol. I.
3. Davidson, Tropical Abscess of Liver, Allbutt's System of Med., 1908, Vol. II.
4. Stitt, Lecture Course on Tropical Diseases, U. S. Naval Med. Sch., Jan. 5, 1909.
5. Manson, Tropical Diseases, New York, 1908.
6. Rogers, Fevers in the Tropics, 1908.

The pathology of liver abscess presents for consideration (1) the presupplicative stage and (2) that of the developed abscess.

The presupplicative stage of liver abscess, whatever be its pathogenesis, is always a focal hepatitis, doubtless always grafted on an acute or chronic passive congestion. In other words, a liver abscess must of necessity have had an antecedent focus of inflammation, the process of which, having advanced, eventually underwent colliquative necrosis. Statistics all tend to show that the process occurs in a liver previously damaged by dietetic errors or excesses particularly overindulgence in alcohol.

In a liver whose powers of resistance to the lodgment and future pathogenetic activity of a poison, be it chemic, protozoal, or bacterial, have been lowered, predisposition to the disease occurs and the exciting cause operates. In the majority of instances this exciting cause enters by way of the portal vein, lodges in an interlobular capillary branch no longer of sufficient caliber to carry it, and the microscopic picture from that moment may be described as follows: The liver cells in the immediate neighborhood of the causative agent become swollen and hyaline in appearance and, at the same time, seem to be compressed. The nuclei stain poorly, and the condition closely resembles one of coagulation necrosis. At the periphery of the necrosed area is a zone of infiltrating leucocytes, of the mononuclear variety, which gradually insinuate themselves between the columns of liver cells. Amœbæ are frequently found in the necrotic zone. They show no tendency to penetrate deeper on the one hand or to be thrown off into the pus on the other. Those cells of the lobules first to suffer are the peripheral ones as they are nearer the focus of the process. Necrosis advances in all directions from this interlobular capillary, encroaching on all adjacent lobules. Sachs has pointed out that at this stage there is probably an attempt on the part of the liver to form new connective tissue to replace the degenerated parenchyma. This actually occurs and fibrosis is accomplished in alcoholic livers in the temperate zones; but apparently reparative power is in abeyance in the tropics and its weak attempts soon give way to the activity of the causative agent. Necrosis and softening go hand in hand till finally the abscess results.

The stage of the developed abscess is an interesting one, as shown by the character of the pus. The contents of the liver abscess are finely granular debris containing fragments of liver cells; a few leucocytes, generally mononuclear; red blood cells; oil globules; hæmatoidin crystals and amœbæ or bacteria (Staphylococci, Streptococci, *B. coli*, etc.), or both. The most characteristic feature, at least in the amoebic variety of abscess where pyogenic infection is not also present, is the absence, or presence in small number only, of polymorphonuclear leucocytes.

The walls of the abscess show a ragged surface of shaggy necrosis, the outline of which is such as to indicate that the necrosis progressed from the interlobular areas.

The size of tropical liver abscess varies from a few millimeters in diameter, to that of a man's head. In one of Strong's cases only a shell of liver tissue, inside its capsule, was left to surround the pus.

The situation of the abscess is in the right lobe of the liver in about 90 per cent of the cases and in the left lobe in the remainder. The upper and posterior part, or dome, of the right lobe seems to be the favorite location.

The reports of the different observers upon the percentages of simple and multiple abscesses are much at variance but, approximately, 70 per cent appear to be single, 11 per cent double, and 14 per cent multiple.

The differential diagnosis of liver abscess.—The diagnosis of this, the most distinct surgical disease of the Tropics, is not always easy. Stitt says that the patient with liver abscess may not exhibit a single symptom; Strong states that liver abscess is frequently overlooked, and that this is not strange, since its development is sometimes so insidious that perforation gives the first indication of its existence; and, according to Manson, of all the grave tropical diseases no other is so frequently overlooked. Thus, just in proportion to the vagueness of its symptomatology and the insidiousness of its development, is it mistaken for other conditions referable to the important organ in which it occurs and to other structures in its neighborhood.

A simple enumeration of such conditions will serve to elucidate this point and give a clearer idea of the possibility of errors in diagnosis dependent upon them. Briefly stated they are as follows: (a) Various forms of hepatitis, e. g., hepatitis of a nonsuppurative nature, such as that attending malarial attacks; presuppurative hepatitis; syphilitic hepatitis, the softening gummata of which are often attended with a fever of hectic type; pyelephlebitis; suppurative hydatid; gallstone and inflammation of the gall bladder; Malta fever; kala-azar; and trypanosomiasis. (b) Conditions not belonging to the liver itself, but to the structures of the immediate neighborhood, such as subphrenic abscess; abscess of the abdominal or thoracic wall; pleurisy; pneumonia; encysted empyema; and pyelitis of the right kidney. Any of these may be attended with fever of a hectic type; increased area of hepatic percussion dullness and pain in or about the liver.

Manson says that many times correct diagnosis can be made only by repeated and careful study of the case in all its aspects.

Since liver abscess is so frequent in the Tropics and its onset so obscure it is well to be guided by a quotation from the same observer:

Golden rules in tropical practice are, to think of hepatic abscess in all cases of progressive deterioration of health, and to suspect liver abscess in all obscure abdominal cases associated with evening rise of temperature, and this particularly if there be enlargement of, or pain in, the liver, leucocytosis, and a history of dysentery.

The crux of diagnosis is aspiration. Conditions to be differentiated are as follows (when their characteristics are contrasted with those of a liver abscess whose onset is more acute, the diagnosis is simplified):

1. Suppurative hydatid cyst: Here the history of a very slow and painless growth is suggestive, but actual diagnosis must be made by means of the aspirator, hooklets in the pus determining this condition.

2. A distended and inflamed gall-bladder will be distinguished by its pear-shaped form and mobility and the fact that jaundice is increased with each paroxysm.

3. Pylephlebitic abscess may sometimes be distinguished by tracing the same to a focus of suppuration in the portal area, but since tropical abscess may contain pyogenic organisms, aspiration here is appropriate, although it may not conclusively differentiate.

4. Empyema is differentiated by aspiration.

5. *Basal pneumonia*.—It must be remembered here that although the condition may be primary it may also be simply secondary to abscess of the liver, the inflammatory process having extended to the lung.

6. Cancer may be excluded by the history of marked cachexia, and palpation of hard nodules on the surface of the liver.

7. Malaria is, perhaps more frequently confounded with liver abscess than is any other condition, but here the diagnosis should be easy with the distinct manifestations of malaria in mind: (*a*) In malaria the fever is usually a morning event, while in hepatic abscess the rise occurs in the afternoon; (*b*) in malaria, if the liver is enlarged, the spleen is more so; (*c*) the discovery of the malarial parasites; and (*d*) the results of exhibitions of quinine.

8. Syphilitic conditions of the liver may be determined by the Wassermann precipitin test.

There are certain cardinal points in the symptomatology of liver abscess which will go far toward aiding diagnosis in the more clear-cut cases. They are, briefly, as follows: (*a*) History of present or antecedent dysentery; (*b*) discovery of amœbæ in the stools; (*c*) irregular fever with chills and sweats—the rise of temperature occurring in the afternoon and the drenching sweats at night; (*d*) hepatic pain of a dull nature, frequently only vague but readily elicited, according to Stitt, by jolting the liver between the hands of the examiner. It is suggested by the same author that a single good hard jolt be depended upon, as the patient may object to a second attempt; (*e*) the ducubitus is usually a right-sided one, the patient generally lying toward his abscess to relieve the tension upon the inflamed ligaments; (*f*) pain referred by way of the phrenic nerve to the right shoulder is present in one-sixth of the cases, but this is found in other conditions; (*g*) a subicteric tinge is usually present; (*h*) Rogers reports from his cases in India that leucocytosis, of from fifteen to thirty thousand, is fairly constant and that the differential polymorphonuclears are low, only about 75 to 77 per cent, while the large mononuclears, so characteristic of protozoal infection, are moderately increased; (*i*) Axissa reports from his cases in Egypt that a constant increase of ammonia in the urine, equal to from 9 to 24 per cent of the total nitrogen with simultaneous reduction of the propor-

tion of urea, together with a coincident alimentary levulosuria, justifies exploratory laparotomy in dubious cases.

In conclusion, it is suggested that other observations, like those of Rogers and Axissa—perhaps something along the line of determination of the opsonic power, may serve to simplify the diagnosis of this most gravely important, but too often obscure, surgical disease of the Tropics. Every available simple, rapid, and efficient method of clinical determination must be employed in the study and observation of cases of tropical abscess. Ammonia in the urine is now estimated in less time than is required for the estimation of sugar, and the modified Leishman method requires but little time and skill and is readily applicable to the determination of the organism responsible for an infection, as in Wright's method. Since the ætiology is in doubt, here would seem to be not only a possible means of diagnosis, but also a method of actually determining the causative agent, if it is bacterial, by noting marked variation from the normal in the patient's opsonic index. As yet, however, the final resort in diagnosis must be the aspirator.

THE TREATMENT OF LIVER ABSCESS WITH SPECIAL REFERENCE TO SURGICAL TREATMENT.

By Asst. Surg. G. F. COTTLE, U. S. Navy.

1. Davidson, Tropical Diseases, Allbutt's System of Med., 1908, Vol. II. p. 579.
2. Strong, Amœbic Dysentery, Osler's System of Med., 1907, Vol. I.
3. Manson, Tropical Diseases, New York, 1908.
4. McDill, Jour. Am. Med. Assn., Aug. 10, 1907.
5. Musgrave and Woolley, Jour. Am. Med. Assn., Oct., 1907.
6. Pinkham, The Military Surgeon, 1904, p. 301.
7. Councilman and La Fleur.
8. Cantlie.

To lessen the incidence of liver abscess we must look for a more prompt, vigorous, and successful treatment of amœbic dysentery and to a better understanding of that vaguely defined, yet very real, condition called tropical liver, which is said to precede suppuration in every case. The treatment of the disease is essentially surgical, its purpose being evacuation of the abscess and the ultimate complete recovery of the patient. This plan applies with equal force to the management of all liver abscesses, whether they arise outside of the organ and are called liver abscess merely because of their proximity, or whether they arise in the substance of the liver itself. We will here deal with the last class, the intra-hepatic, and especially that variety called tropical abscess; that in which the entamœba is considered the prime causative factor and in which dysentery is sometimes a complication at the time of operation.

The large number of liver abscesses found only at autopsy, in cases dying of amœbic dysentery, gives striking and tragic evidence of the difficulty of diagnosis, and should act as a stimulus to those at

work in the Tropics to be more ready to suspect its presence and more ready to employ that diagnostic necessity—exploratory puncture.

A needle should not be plunged into the liver without full knowledge of its immediate and remote dangers. Death from hemorrhage, the onset of general peritonitis, or the occurrence of empyema are possibilities not to be disregarded. To avoid hemorrhage from the vena cava, Cantlie recommends that "an exploratory needle be passed no deeper than $3\frac{1}{4}$ inches in a chest 32 inches in circumference." We continually read and hear the statement, "liver abscess-pus is sterile;" yet in Allbutt's System 79 cases are quoted, in which 48, or nearly 60 per cent, showed bacteria, and he states: "The possibility that bacteria are always present at the earliest stage of amoebic abscess can not at present be excluded." Though the question of the bacterial content of these abscesses needs more elucidation before a final statement is possible, it is just because staphylococci, streptococci, and bacillus coli communis are found in a number of cases that practically all surgeons act in accordance with the idea that the pus to be found may contain bacteria capable of causing death from peritonitis, and insist that operation should immediately follow the use of the needle. A general anesthetic should always be used—not only to obviate pain, but also because its employment permits that degree of care and thoroughness so necessary to a safe and satisfactory exploration and evacuation if pus is found, and to avoid the dangers mentioned. The possibility of a negative finding need not act as a restraint, for repeated puncture, when pus was not present, has often been followed by marked improvement in the patient, a diminution in the size of the liver, and even a final disappearance of all threatening symptoms.

If aspiration fails to reveal pus and if the other signs are sufficiently definite and urgent, an exploratory operation, by the abdominal route, allowing the surgeon to sweep his hand over the surface of the liver, may be indicated. If quickly performed, this operation will, in such a case, do no harm, and is more justifiable than permitting the possible presence of pus to pass without action. The abscess is said to give a sensation of hardness to the palpating hand, due to the pressure of the contained material.

Manson follows exploratory puncture by plunging a large trocar and canula into the abscess and then passing a rubber drainage tube through the canula to the bottom of the abscess cavity. For this simple and, as he performs it, ingenious operation he claims excellent results. It is a measure to be employed only when good surgical surroundings are impossible of attainment. Most American and many English surgeons look upon this method as a relic of the dark ages of surgery and speak of it only to condemn it.

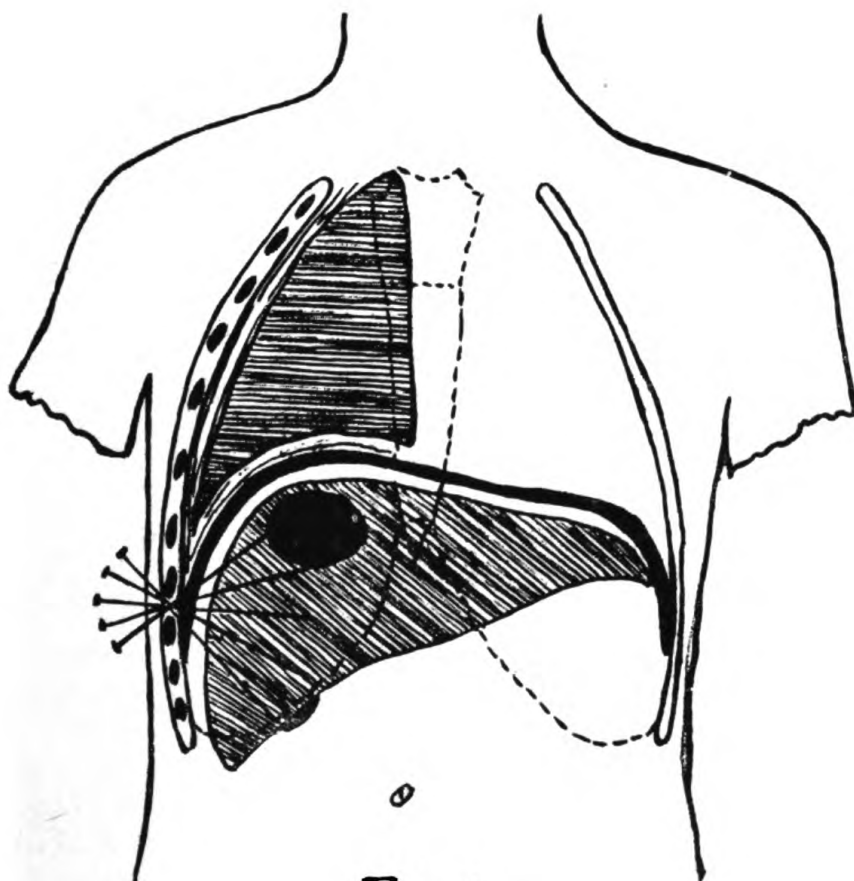


Fig. 1

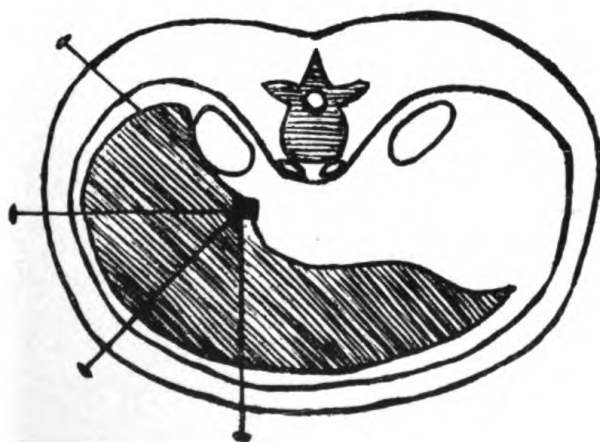


Fig 2

FIG. 1.—SHOWS IN HOW MANY DIRECTIONS NEEDLE MAY PASS THROUGH A VERTICAL PLANE AT ONE PUNCTURE HOLE.

FIG. 2 (TAKEN FROM CANTLIE).—SHOWS THE VENA CAVA EQUIDISTANT FROM SKIN IN HORIZONTAL PLANE BELOW PLEURA AND FROM XYPHOID TO ANGLE OF RIB; $4\frac{1}{2}$ INCHES IN CHEST, 32 INCHES IN CIRCUMFERENCE.

The statement is often made: "Liver abscess is as a rule single, and generally situated in the dome of the right lobe." Allbutt's last edition states:

Right lobe, 70 to 80 per cent; left lobe, 5 to 15 per cent; spigelian lobe, 2 to 5 per cent; both lobes, about 9 per cent; single, 61 to 83 per cent; double, 11 per cent; multiple, 14 to 27 per cent; while in autopsies 34 per cent only were single and 66 per cent multiple.

It may be convenient for our memories to say, "Liver abscess is typically single and situated in the right lobe," but it must not be forgotten how frequently it is atypical. It is the variability in both site and number that has necessitated so many operations for the disease in a single case, making the simple dictum "incise and drain" become a detailed description of many routes by which the liver may be approached. The surgeon who would properly care for a given case must therefore be thoroughly familiar with the practical operative details of all these routes before he plunges the needle which will tell him by what route drainage had best be instituted.

The various standard operations are described in the later works on operative surgery and need not be given here. The routes may be classified as follows: The abdominal, subcostal; the thoracic, intercostal, chondroplastic, subpleural, transpleural.

The liver is deeply seated in the upper part of the abdominal cavity surrounded by the bony and muscular walls of the chest and closely overlapped by the diaphragm. Only at the small area in the costal angle just above the stomach is it approachable through the soft tissues alone. To reach it the peritoneal cavity must be traversed, and in many cases the pleural cavity as well. These anatomical facts give an understanding of the general indications for the several routes. The subcostal encounters no bony wall, but, unless adhesions have already formed, it is difficult to prevent contamination of the peritoneum. This avenue is useful for exploration and for abscesses low down, whether in the right or in the left lobe. If at the side of the right lobe, a transversely curved incision in the abdominal wall, if in front, an oblique incision parallel with the costal border, or a verticle one through the linea semilunaris, may be made for either right or left lobe. The chondroplastic allows a good exposure of an abscess situated in the anterior aspect of either lobe or of one in the spigelian lobe. It is seldom used. The intercostal gives very little room for a proper exposure of the structures to be traversed and is applicable only to those cases which have been so long in coming to operation that the pus has burrowed out to the chest wall, shown by local bulging, œdema, etc. The use of this incision means generally a patient in such poor condition that a more thorough operation is contraindicated. The last two routes, subpleural and transpleural, necessitate the removal of parts of one or more ribs, with the

suture of the diaphragm to the liver and to the chest wall, when this is practicable. They differ only in that the first reaches the liver by going below the pleura, the second by going through it, seeking by special detail at this stage of the operation to avoid collapse of the lung and contamination of the pleura. While theoretically the subpleural is the best, the transpleural is now most frequently used because as a rule the abscess is higher up in the dome of the liver and hence better drained by a high incision and because experience has shown that if the pleura is properly handled during the operation no harm will come of passing through it.

The steps to be followed in a given case may now be stated. Preparation of the patient differs in no essential from that for other major operations. Active medicinal treatment should cease. Active catharsis the night before operation can be omitted, an enema being sufficient in most cases. The anesthetic, preferably ether, should be administered by a competent person who has a full understanding of the seriousness of operation on a patient weakened by prolonged disease, and who will be able to assist the surgeon by an intelligent watchfulness of the patient's condition throughout the operation. The exploratory needle should be of large enough caliber to allow the thick liver pus to show itself—at least one-eighth inch bore. It should be inserted, if possible, below the line of the pleura—roughly, a hand's breadth above the costal margin in the anterior axillary line, and at a point indicated by the physical signs, remembering the usual site of the gall bladder and of the portal vein. In the absence of signs, the ninth space in the right anterior axillary line is best. It should be plunged no deeper than three and three-quarters inches from the skin in a chest of 32 inches circumference, and in as many directions as seems advisable at the time. According to Manson, at least six punctures should be made before the attempt to find pus be abandoned. When pus is found the surgeon must immediately decide by which route in the particular case drainage will be best obtained. If the needle is below the costal margin it should be left in as a guide until the incision is deepened to the liver. If the transpleural route is indicated, a long skin incision and the removal of plenty of rib, generally about four inches of the eighth and ninth, will greatly facilitate the handling of the pleura and of the liver at the bottom of the deep wound. The pleura is best shut off by having an assistant hold a roll of gauze tightly against it above while it is cut through and sutured to the endothoracic fascia. When the diaphragm has been traversed and the liver reached, a second important decision must be made—whether to at once enter the liver and evacuate the pus or wait twenty-four or forty-eight hours, doing the operation in two stages. If good limiting adhesions have already formed, or if by proper handling of the diaphragm, pleura, and

liver, the pleural and peritoneal sacs are well protected, the final stage of the operation may be done at once. If, however, these sacs are not well guarded, or if the patient's condition precludes any further prolongation of the operation, it is better to wait. Before entering the liver the pus should again be located by the needle, then a blunt instrument, such as an artery clamp or blunt scissors, is passed along the needle's track and opened, tearing through rather than cutting into the liver, in order to lessen hemorrhage. The finger then explores the cavity, gently breaking down any septa that may exist and dilating the opening sufficiently to allow the introduction of a large drainage tube which should extend to the farthest limit of the cavity. A culture and a smear of the pus should be carefully taken in order to throw more light on the question of the frequency of bacterial content in these abscesses and because it may help in making a prognosis. For a few days voluminous dressings will be necessary to receive the copious discharge, and then in a week or so the discharge will rapidly lessen and soon, in cases which are doing well, almost cease, and the tube—which should not be renewed for at least a week, will gradually be extruded by the healing of the cavity from the bottom. Every case thus operated on does not do well. It is of the utmost importance to see that the drain is kept at the bottom of the cavity. In some cases the temperature remains high after operation. When this occurs the first concern is with the drains. Should they be found all right, we must suspect that instead of a single abscess we have multiple abscesses, and these must be sought, again using exploratory puncture if necessary, and, when found, opened. Occasionally the persistence of temperature may mean that in spite of our care to avoid it empyema has occurred and, when present, this must be treated either by a separate thoracotomy or by breaking through the diaphragm in the original incision.

Irrigation of the abscess cavity with quinine may be of use if a discharge loaded with amœbæ persists, and possibly, if a large bacterial content is present, some weak antiseptic may be used. But the possibility of absorption from the liver cavity with serious, if not fatal, poisoning must ever be borne in mind. It may be said of this abscess as of any other, that irrigation will seldom be necessary if the opening for drainage is sufficiently large and properly placed. As to the results of treatment, unoperated, all cases sooner or later either die of sepsis or exhaustion, or the abscess evacuates itself. Those cases which evacuate spontaneously are mostly fatal; those which rupture into the lung and those whose contents are coughed up and expectorated are the most apt to recover; and those which perforate into the intestine form the next most favorable class; but fully 80 per cent of all unoperated cases die.

When we consider the statistics of cases operated on we find great diversity of statement. The mortality varies from 70 per cent to 20 per cent, roughly. McDill, whose experience has been large enough to make his statements of value, says that in single abscess cases the mortality should not be over 20 per cent. Even with the best surgical treatment the condition is very grave, for the reason that it is the most serious complication of a prolonged, intractable, and often debilitating disease. For a reduction of the mortality we must look to early diagnosis, the presentation of cases for operation before the pus has extended beyond the liver, and before secondary bacterial infection has occurred.

In those cases where the operation is successful and the patient has entered upon his convalescence, the most careful treatment and management is necessary before he can be said to have returned to health. The liver has been partly and sometimes very largely destroyed; the intestinal canal in the amœbic cases is more or less seriously involved by a destructive disease; the patient's blood, tissues, and general physical tone have been reduced by prolonged sepsis and invalidism. The most stimulating, supportive, and tonic treatment is indicated. With a liver and colon which, to a considerable degree, have lost their digestive, absorptive, and assimilative powers, and with the capacity of the liver for the elimination of body poisons reduced, a nutritious, easily digested diet and proper amount of daily exercise must be prescribed to fit the particular patient. His weight should be noted; his blood examined from time to time; his stools watched for amœbæ; chronic dysentery, if present, met with the best means at hand, medicinal or surgical; if in a tropical country, the change to a temperate climate considered; and, finally, a decision reached as to whether the patient should be advised to stay the rest of his life in a region where the cause of the disease is most apt to remain quiescent.

In conclusion, the successful treatment of liver abscess depends on an early diagnosis; upon the skill of the surgeon in the use of the exploratory needle; the exercise of trained judgment in the selection of the route for the drainage; the ability to decide correctly for a two or a one stage operation; and, finally, upon the painstaking attention to those details of medicine, diet, hygiene and habitat which will best enable the man attacked by this disease to return to a state of reasonable health and usefulness.

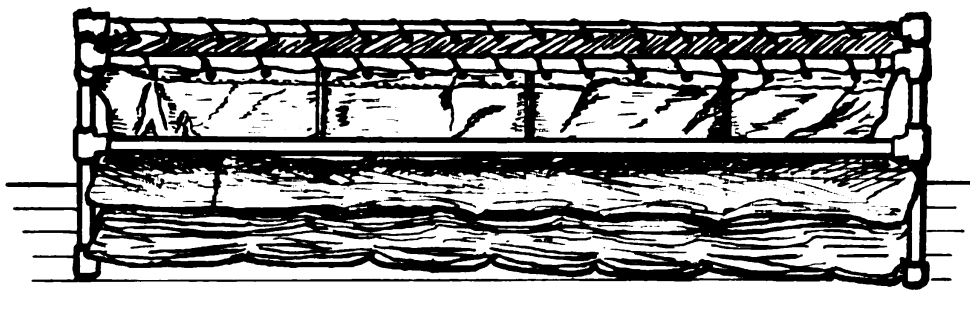


Fig. 1.

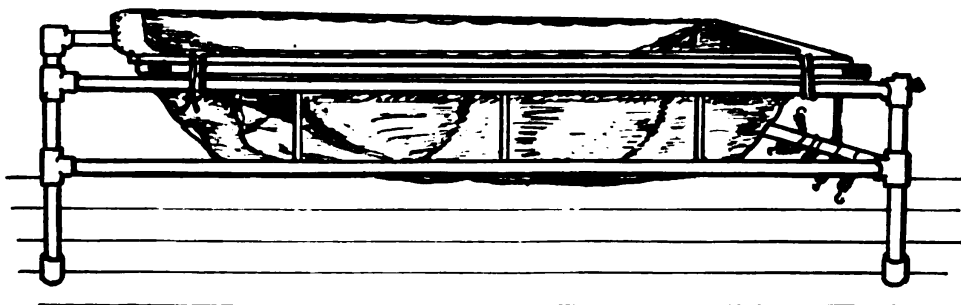


Fig. 2

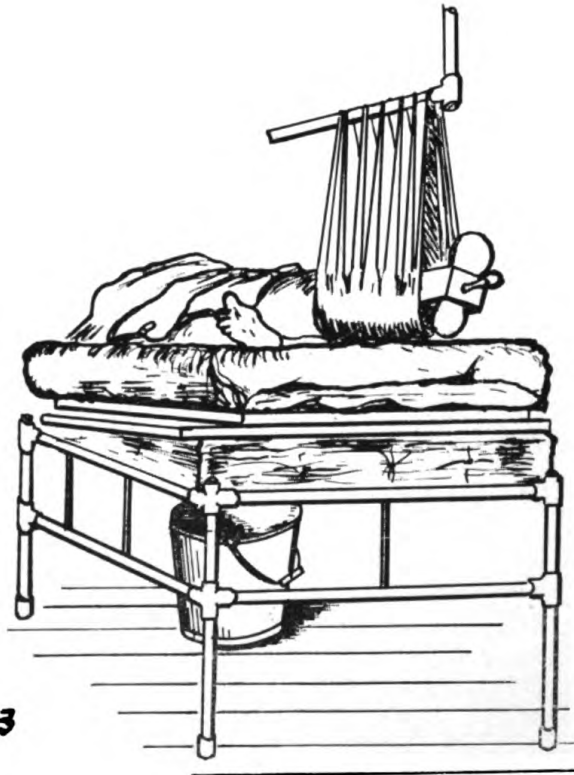


Fig 3

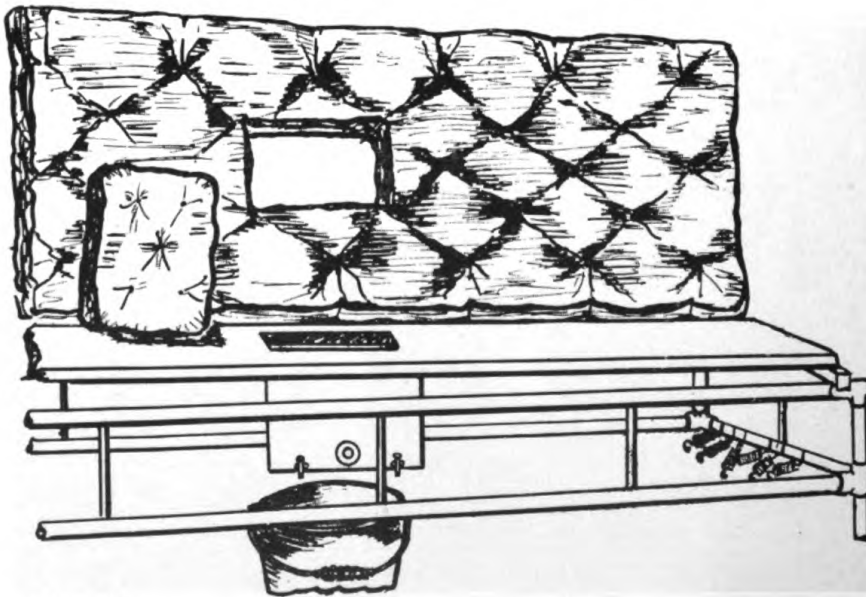


Fig 4

SUGGESTED DEVICES.

APPLIANCES IMPROVISED ON SICK-BAY BUNKS.

By Surg. C. M. DE VALIN, U. S. Navy.

Figure 1 shows an emergency tub made by lashing canvas to a bunk frame and supporting it by placing mattresses underneath. This tub, devised to meet a sudden necessity, was made in fifteen minutes, and was used for four days to keep a case of extensive burn submerged in warm normal saline solution. This method of treatment, in the experience of those who have practiced it, is so manifestly superior to all others that it deserves more widespread use on board ship where cases of extensive burns are not uncommon, but where, ordinarily, facilities for this method of treatment are not at hand.

Figure 2 shows a portable canvas tub made by tacking canvas to an ordinary cot frame which is then lashed to a bunk frame. This tub may be used for tubbing typhoids, pneumonias, etc., and obviates the necessity of transporting the patient to the bathroom, besides being much more comfortable to the patient.

A fracture bed adapted to the present type of sick-bay bunk is also shown. (Figs. 3 and 4.)

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CLINICAL NOTES.

A CASE OF FRACTURE OF PATELLA, WITH OPERATION AT SEA.

(From the U. S. S. *New Jersey*.)

By Surg. N. J. BLACKWOOD, U. S. Navy.

On the evening of January 1, 1909, the ship being in the Red Sea, headed for Suez, with the Atlantic Fleet, the patient fell from the after fighting top to the deck below, a distance of over 20 feet. He landed principally on the left knee, and upon examination that patella was found to be fractured, both vertically and horizontally, the separation of the upper and lower fragments being about 2 inches. The leg was placed on a long posterior splint, and the fragments approximated by a figure-of-eight bandage. The next day, it having been decided to operate, at about 10.30 a. m. the patient was etherized and the kneejoint opened by a longitudinal incision, as recommended in Stimson's method of mediate suture. Upon reaching the patella it was found that there was a transverse fracture, and the lower fragment was again broken longitudinally, while the edges of this T-shaped fracture were splintered at the expense of the internal edge and the fragments driven into the joint. There had been considerable hemorrhage into the joint, which was now filled with clots, but all active hemorrhage had ceased. The joint was thoroughly flushed out with hot normal salt solution, all clots washed out, and the loose fragments and spicules of bone to the number of about ten removed. A mattress suture of strong silk was now passed through the quadriceps extensor tendon and the ligamentum patellæ, the fragments drawn together by the fingers of an assistant and held securely apposed by tension on this suture. The capsule, which was completely torn, was carefully sutured from side to side with a catgut ligature, including in the suture the fibro-periosteal covering of the bone, special attention being paid to the removal of all shreds and loose ends of tissues from between the fragments. The fibrous tissues overlying the patella were then sutured with catgut and the skin wound closed with an interrupted suture, no drainage being

introduced. The wound being covered with several layers of aseptic gauze, the whole leg from ankle to hip was inclosed in a fenestrated plaster bandage. There was not a single bad symptom following the operation, and on the ninth day the stitches were removed through the fenestrum, without disturbing the splint, the wound being perfectly and completely healed. On the twenty-second day, the plaster bandage having become soft and cracked, it was removed and a new one applied, after having given some massage and slight passive motion of a degree or two. At this time it was found by digital examination that the fragments were apparently firmly united and the patella freely movable laterally.

On the 9th of February the plaster cast was removed and systematic daily massage and passive motion begun, which was continued up to the time patient was discharged to duty. At this time the knee was flexed about 10° before any pain or stiffness became evident. On February 16 patient was up and walking with the aid of crutches, and on March 13 he was so fully recovered as to walk over 4 miles without fatigue and without the aid of even a cane, and he was able to flex his knee considerably beyond the right angle.

The accompanying X-ray picture was taken about the time of the patient's discharge to duty, and shows the line of the transverse fracture.

This operation brings before us several interesting points for consideration, the first of which is whether in the case of a simple fracture of the patella one is justified in opening the knee joint, or whether the injury should be treated by some one of the many other methods. Speaking of the treatment of this injury by wiring, Lord Lister said:

No man is justified in performing such an operation unless he can say with a clear conscience that he considers himself morally certain of avoiding the entrance of any septic mischief into the wound.

In "The Treatment of Fractures," by Scudder, 1907, we find the following:

In deciding whether a given case should be treated by operation or not, the following considerations should be carefully weighed: A closed fracture of the patella does not in itself endanger life. It may be treated by the conservative method without added risk. If properly treated, the result will often be satisfactory as far as functional usefulness of the knee is concerned. The operative method consumes less time in convalescence and an excellent result is achieved, but operation exposes to danger of sepsis. If sepsis results, the following conditions are imminent. A stiff knee, amputation of the thigh, and possibly death from septic infection. Whether operation shall be done or not, therefore, depends upon the degree of safety with which it can be performed. It is the surest method of securing perfect apposition and bony union. It should be undertaken only by surgeons of exceptional judgment and great skill.



SHOWING LINE OF TRANSVERSE FRACTURE.

In Jaconson and Rowland's "Operations of Surgery," they point out a number of considerations to be thought of in this connection, the chief of which are the following:

(1) Age of patient; (2) amount of separation—i. e., a distance of over half an inch; (3) marked tilting; (4) great distension, as this is an indication as far as it goes of laceration of the lateral parts of the capsule; (5) the occupation of the patient; the more active this is, the more it involves work on different levels, the more is operative treatment indicated.

The last word on the subject has been well summed up in the splendid present edition of Keen's "Surgery," which says:

In regard to which method of treatment to choose, operative or nonoperative, it may be said that if every requirement of strictest asepsis can be secured, the most satisfactory results will be obtained by suturing the patella. The hæmorrhage into the joint is at once disposed of, the apposition of the fragments is accurate, tilting is overcome, the periosteum does not get in between the fragments, and massage and passive motion can be begun earlier. The additional advantages are that the chances of bony union are far greater; one can also repair the tear in the aponeurosis, and there is less danger of re-fracture.

Having decided upon an open operation the next question is, When shall this operation be performed? Should we do it at once, or wait a week or ten days, until all the acute symptoms have subsided, and when the dangers of infection may be supposed to be less? Authorities and surgeons throughout the country differ widely on the subject. Scudder says that the acute symptoms should be allowed to subside before operation, and recommends that the effusion around the joint should be removed by aspiration under strictest aseptic precautions forty-eight hours after the fracture, and says, further, that "no attempt should be made to reduce the fragments until nearly all the fluid is removed from the kneejoint." In Keen's "Surgery" we find the following, which was the opinion we had formed and upon which we had acted:

Many surgeons prefer to wait until the end of the first week. Experience has shown that it is perfectly safe to operate within the first twenty-four to forty-eight hours after the injury. Many surgeons who use the operative treatment do not wait for the absorption of the blood, but operate as soon as possible after the injury. From my personal experience I believe that this is a perfectly safe mode of procedure. Aspiration of the blood is very unsatisfactory on account of the clots.

At this point it may be interesting to note what Keen says as to the probabilities of success as regards a bony union in these cases:

Whether bony union ever occurs after a fracture of the patella is still an unsettled question. Thiem, who has made a study of this subject, says there are no instances of a bony union. Hoffa and others claim that bony union is possible. Although bony union has undoubtedly occurred, it is very rare in transverse fracture. In the oblique and longitudinal varieties it is the rule.

As to the after treatment of these cases, more authorities recommend the beginning of slight massage and passive motion at the end of two weeks and at the end of four weeks this should be daily. After about six weeks to two months, a flannel bandage and a cane will be all the protection needed to the knee. At the end of three months the knee should be functionally perfect. In the matter of sutures, we believe that absorbable ones are to be preferred, and while chromicized gut or kangaroo tendon are recommended by more authorities for suturing the torn capsule, we used plain catgut in this case, because we had nothing else, and our result seems to show that it may be used with safety.

In conclusion, we may sum up the weight of evidence on this subject as follows:

1. With the strictest asepsis, the best results will be obtained in fractured patella by operation and suturing of the ruptured capsule.
2. That it is perfectly safe to operate within twenty-four or forty-eight hours after the injury, and not necessary to wait until the acute symptoms have subsided.
3. That absorbable sutures are the best for the buried sutures, even though they be plain catgut.
4. That massage and passive motion should be begun early, and continued systematically until complete functional recovery has been secured.

A CASE OF RECURRENT NASAL HEMORRHAGE.

By Surg. RAYMOND SPEAR, U. S. Navy.

G. L. A., hospital apprentice, age 20 years, was struck on the left side of his nose by a pitched ball on May 16, 1909. The left nasal bone was fractured, as were also the vomer and mesethmoid. At the time of injury there was considerable hemorrhage from both nostrils; the hemorrhage was controlled by packing.

On May 17 and 18 he lost a large quantity of blood from both nostrils; hemorrhage was controlled by plugging the posterior nares and packing the nasal cavities. On May 19 he had a profuse hemorrhage from the right nostril; this hemorrhage was also controlled by packing the anterior and the posterior nares. There was a slight ooze from the right nostril until May 25, when another hemorrhage occurred. Beginning May 26 there occurred a number of hemorrhages from the right nostril; these continued until June 6; then all bleeding ceased. From May 16 to June 6 the boy probably lost about 3 quarts of blood.

The nature of the hemorrhage was peculiar; the bleeding was profuse while it lasted and stopped apparently when the blood pressure lowered. Several careful examinations of the nasal cavity failed to

reveal the source of the bleeding, but in all probability the bleeding point was situated in the right side in the mesethmoid region. The blood either came from a small artery that had been partially torn by the bone fragments or may have come from a damaged plexus of veins.

There was no hæmophilia in the boy's history nor in the history of his family.

As the case progressed and the boy lost more blood he became more anæmic. His condition was critical and it was imperative to control the bleeding.

The nose is supplied with blood externally by branches from the facial arteries, the lower part of the septum also is supplied from the same sources. Internally the arteries of the nasal fossæ are the anterior and posterior ethmoidal, from the ophthalmic which supply the roof of the nose; the sphenopalatine, from the internal maxillary which supplies the mucous membrane of the meatuses and the septum; the inferior artery of the septum from the facial, the infraorbital and alveolar branches of the internal maxillary. These arteries form a plexiform network beneath and in the substance of the mucous membrane.—GRAY.

With this free anastomatic blood supply it is difficult to determine offhand what arteries best control the blood supply of a certain definite portion of the nose. The facials supply the blood to the coronary and lateralis nasi arteries. The two external carotids through the internal maxillaries supply most of the blood to the interior of the nose, but these branches, while anastomosing with one another in turn, anastomose with the ethmoidal branches from the ophthalmics, which are branches of the internal carotids. So to control all bleeding to the deep septum effectually, it is necessary to tie both internal and both external, or what would amount to the same thing, both common carotids.

The application of ligatures to both external carotids is usually unattended with danger, but when we tie an internal or a common carotid we shut off a large supply of blood to the brain, and we are confronted by the possibility of an 11 per cent to 20 per cent possibility of accident in the way of brain softening or insanity, etc., so that other measures are to be tried first.

In this case both facials were tied without success; these arteries were tied because it was thought that pressure over them controlled the hemorrhage. This was probably a false observation, as the bleeding usually stopped itself. It was noticed that pressure over the right common carotid stopped the bleeding, so under cocaine anæsthesia the carotids on the right side were exposed; the external was ligated and a ligature was placed around the internal, but was not

tied. This procedure controlled the hemorrhage for thirty hours, when it recurred, but to a much less degree.

The next point to be decided was as to whether or not it was advisable to ligate the external carotid on the left side for, anatomically, and also from the fact that pressure over the left common carotid controlled the bleeding, there was every reason to believe that the blood was coming from that vessel. Owing to the boy's condition of shock the operation was delayed and the bleeding controlled by plugs, ice to the nose locally and pressure over the left common carotid down on the carotid tubercle of Chassaignac.

On June 5 both nares were plugged with strips of gauze supported by Kyle's long nasal splints. This procedure controlled the hemorrhage. On June 6 these splints were removed; the bleeding again started, but was controlled by placing two long plugs made of twisted cotton soaked in a solution of boric acid; these plugs were placed in the right nasal chamber well back and upward on the vomer and mesethmoid, and held in position by one long Kyle nasal splint. These plugs were left in place for forty-eight hours, the nasal cavity being kept fairly clean by dropping a little boric acid solution into and about the splint every two hours. The plugs were gently removed and replaced by others of a similar character which were also left in position for forty-eight hours; these were replaced by one plug which was left in for twenty-four hours. No bleeding occurred after the introduction of the cotton plugs.

During the progress of the case gelatin was given in large quantities by the mouth, as was also calcium lactate and injections of 30 c. c. of rabbit's serum, all with the idea of increasing the coagulability of the blood. No stimulants were given and liquids were cut down, the head was kept elevated, measures intended to reduce the blood pressure in the vessels of the head. Adrenalin was used locally and on the nasal plugs to contract the blood vessels.

If it had been necessary to tie the left external carotid, and if the bleeding had still continued, it was proposed to perform a Brun's osteoplastic resection of the nose, which operation would expose the whole of the deep nasal septum and make easy any necessary surgical procedure to control the hemorrhage.

The lesson to be learned from this case, as in many others, is to endeavor to control the hemorrhage by measures directed directly to the bleeding point.

A CASE OF TRAUMATIC PNEUMONIA.

By Asst. Surg. CHARLES F. STERNE, U. S. Navy.

The following case is reported in view of the fact that pneumonia, with trauma as an etiological factor, is rather rare and also because it shows another form of injury incident to coaling ship.

G. F. P., ordinary seaman, on board U. S. S. *New Hampshire*, was struck on the left chest by a large coal bag while coaling ship on September 16, 1908, at Bradford, R. I. He reported at the sick bay fifteen or twenty minutes after the accident, complaining of severe pain at the seat of injury. Physical examination revealed nothing except tenderness over area of chest struck. There was no evidence of external injury other than redness and tenderness. No signs could be elicited which would point to fracture of a rib nor was there any constitutional disturbance other than pain on respiration. The injury was therefore treated as a contusion. At 7 p. m. the next day (September 17) he again reported at the sick bay, complaining of some headache, accompanied by persistent pain in chest, with some difficulty of respiration. The temperature taken at this time was 104, pulse 96, and respiration 26. He was put to bed and showed no physical signs other than slight dullness on left side from second to sixth rib in the nipple line. The treatment consisted in the administration of calomel in broken doses, a sponge bath, and the application of an ice cap.

On the morning of September 18 he had a rather severe nasal hemorrhage, temperature had dropped to 100.5, pulse to 84, and respiration to 22. A painful cough developed, dry in character so that no sputum was available. Magnesium sulphate was administered in dose of 1 ounce with good result. The ice cap was continued and he was given two sponge baths during the day. At 1 p. m. his temperature ran to 104 again, the pulse to 96, and respiration to 24. Physical signs were still negative.

September 19: During the night of September 18 the temperature dropped to 102.5 and remained there until 1 p. m., when it rose to 104. All this time pain in chest persisted, respiration became more difficult and painful and the cough became looser and by 8 p. m. the expectoration became blood streaked and tenacious in character. During this day creosotal, 10 minims every four hours, was administered, the ice cap was continued, and also a cold sponge bath was given.

September 20: At 7 a. m. temperature had fallen to 103, pulse had gone to 120, and respiration to 38, but by 11 a. m. the temperature had risen to 104, pulse to 118, and respiration to 42. This was accompanied by slight delirium. There were still no physical signs other than the dullness in the area mentioned above and at 2 p. m. the patient was transferred to the Naval Hospital at Newport.

The facts of the case during his stay at the hospital are not familiar to me, other than that on September 24 his temperature fell by crisis to normal and his convalescence was uneventful.

In reviewing, I wish to call attention to the fact that all through this case the physical signs were negative, but the temperature, pulse,

and character and frequency of the respiration with the rusty sputum were sufficient to make the diagnosis. The element of trauma is interesting, as it is a rare cause of pneumonia and in this case was evidently directly responsible for the disease in view of the fact that the patient was previously perfectly well and had no history of exposure nor any of the other well-known predisposing factors in the etiology of pneumonia.

A CASE OF LIVER ABSCESS.

(From Camp Elliott, Isthmian Canal Zone, Panama.)

By Asst. Surg. M. A. STUART, U. S. Navy.

L. B., P. M., was admitted to sick list August 23, 1908, with temperature 102.6°, complaining of pains over right hypochondrium. Quinine was administered without effect. On August 29, a blood count gave leucocytes, 22,600; polys., 67 per cent, at which time he had an evening temperature of 100.4°. On September 15, blood examination gave leucocytes, 14,400; polys., 68 per cent. From September 17-23, temperature remained normal, followed by an evening rise to 99.4-101°. A third blood examination on September 29 gave leucocytes, 12,000; polys., 66 per cent. There was no history of dysentery, but as liver abscess was suspected he was sent to the Isthmian Canal Commission hospital at Colon, Panama, for operation.

Operation was performed October 3, as follows: Incision over gall bladder; gall bladder normal; mesenteric glands enlarged; one removed was reported later as not tubercular by laboratory; no peritoneal tubercles. Appendix about 8 inches long, inflamed, and constricted at mid point; removed. Liver punctured through pleura in three directions; markedly congested; no cavity or pus; adhesions between liver and peritoneum anteriorly.

Following operation patient continued to run an evening temperature of 102-103°. About a week later a pleurisy on right side with effusion developed. Effusion was tapped twice. On October 29 a second operation was performed as follows: Incision over seventh rib, post axillary line; portion of the seventh rib excised, liver punctured, abscess located at dome on right side, abscess incised, about 120 c. c. pus evacuated; drainage tube inserted; pus sterile except for amœba.

Patient rallied from this operation, but continued to run an evening temperature of 100-101°. On November 9 a second abscess was opened without anæsthesia and drained; patient's temperature dropped to normal, but he did not rally, and died on November 13 of exhaustion.

CURRENT COMMENT.

[It is to be remembered that in the publication of these comments the bureau does not necessarily undertake to indorse the opinions expressed, but will lend the pages of this section to discussion of such contemporary topics as will be of interest and value to the service.]

HOSPITAL CORPS EFFICIENCY REPORTS.

It is desired to call the attention of all medical officers to the efficiency reports of the Hospital Corps. (Par. XIII, p. 26, Instructions for Medical Officers, U. S. Navy.) With a view to having complete records covering the entire period of enlistments particular care should be observed that a report is forwarded in every case of transfer, discharge, death, or desertion on any station or ship except receiving ships. Forms for the purpose may be obtained on application to the Bureau of Navigation. The bureau desires to be informed at all times regarding the efficiency of men of this corps, and the importance of prompt compliance with the instructions relative to this report can not be too strongly emphasized.

PHYSICAL DEFECTS FOUND ON REEXAMINATION OF RECRUITS.

Surg. Manley F. Gates, U. S. Navy, in a report on the reexamination of recruits for the U. S. Marine Corps made during October, November, and December, 1908, at the navy-yard, Philadelphia, Pa., has invited attention to a number of striking physical defects which were apparently either entirely overlooked by the examining physician or passed over as being not disqualifying. Although the cases particularly commented upon were originally examined by civilian physicians who naturally are not familiar with service requirements, the report, with accompanying photographs, merits the serious attention of medical officers as emphasizing the necessity for close scrutiny in making physical examinations of recruits and the importance of careful notation, on descriptive lists, of all striking peculiarities which, while not constituting a cause for rejection, may establish the existence of a condition prior to enlistment which might in later years, by misrepresentation, be attributed to service.

Doctor Gates, commenting on the subject, says:

During the three months covered by this report the number of men examined was 108, of whom 11 were rejected. The causes of rejection were *defective vision*, 3; *deformity*, 2; *color-blindness*, 2; *absence of teeth*, 1; *heart disease*, 1; *poor physique and probably incipient tuberculosis*, 1; *hernia*, 1.

Of the appended photographs, those shown in figures 1 to 6 illustrate the causes of rejection in cases capable of being illustrated photographically; figures 7 and 8 are men not surveyed, but whose enlistment was of doubtful propriety, and figures 9 to 11 illustrate some striking peculiarities not noted, or but very inadequately noted, on the enlistment records. One case of absence of an entire distal phalanx, recorded only as "scar," was not photographed.

The results show the need for such reexamination and, more particularly, the necessity for care and experience on the part of those charged with the original examination of applicants. In reexamining these recruits the possibility of malingering has been kept constantly in mind and, where any doubt might arise, as in cases of defective vision, has been fully eliminated by the use of lenses; repeated examinations by different medical officers; and, in some cases, the opinion of specialists was obtained. The men surveyed have in all cases seemed most desirous of remaining in the service, while, on the other hand, some doubtful cases, retained in hope that they might be able to render some service in return for the considerable expense already involved in their enlistment and transfer, have proven to be a source of much trouble to both line and medical officers. An example of this is the case of flat feet shown in figure 8, and whose statement that he suffers severe pain on continued standing or walking, although not accepted, is with difficulty disproved. It is also obvious that many examiners do not appreciate the importance of carefully noting on the outline figures the dimensions of scars and marks and the aid afforded in exactly locating their size and position by definite points, as the nipples, iliac crests, etc., and by the dotted lines on the figure. In one case the acceptance by a civilian examiner of marked cases of color-blindness, and a very erroneous noting of the color of the eyes, has led me to suspect that the examiner was himself color-blind.

SOME OBSERVATIONS ON THE BERTHING OF ENLISTED MEN OF THE NAVY, WITH SUGGESTIONS FOR IMPROVEMENT.

By Surg. L. W. CURTIS, U. S. Navy.

There is no fixed feature of the life of men-of-war's men that so violates first principles of personal hygiene as the plan of berthing on ships of war—that is, in hammocks slung side by side in close touch, from overhead beams; a plan that has existed unchanged from the earliest times to the present, as one apparently not susceptible of improvement, however great has been the amelioration of the naval seaman's living conditions in various other particulars.

The hammock is probably the only practical bed for the enlisted man of the navy; and, while restricting its occupant to a supine position, which is irksome to some, it has, however, advantages over a fixed bed on a vessel in a seaway, and in various other obvious respects as well.

Artificial ventilation of berthing spaces, where this is efficiently employed (which is the case in some but by no means all ships of the navy), has, it is true, vastly improved general atmospheric conditions, but the benefit is only partial when hammocks are down, owing to the manner in which they are slung—that is, side by side from 14 to 18 inches apart, close under the deck overhead. The watch below



FIG. 1.—NO MOLAR TEETH; NOT NOTED ON ENLISTMENT RECORD.



FIG. 2.—HERNIA (RIGHT) PUBIC REGION SHAVED.



FIG. 3.—DEFORMITY FOLLOWING INJURY AND REMOVAL OF PORTION OF SKULL ABOUT 3 INCHES BY 2½ INCHES.

Shows scar of operation. Area pulsated markedly. Patient had epileptic seizure while awaiting discharge.



FIG. 4.—SAME CASE AS SHOWN IN FIG. 3, SHOWING DEPRESSION OF SKULL.

Hair cut close, but was long when man enlisted and concealed deformity.



FIG. 5.—SPINAL CURVATURE; NOT NOTED ON ENLISTMENT RECORD.



FIG. 6.—BACK VIEW OF CASE SHOWN IN FIG. 5.



FIG. 7.—FLAT FEET. NOT SURVEYED CONDITION NOT NOTED IN ENLISTMENT RECORD.

Complains of pain. Statement not accepted, but difficult to disprove.



FIG. 8.—VARICOSE VEINS. NOT SURVEYED.

Stated that he had been enlisted (tentatively accepted?) for the army at Buffalo, N. Y., and rejected on reexamination at Columbus Barracks.



FIG. 9.—DEFORMITY OF LITTLE FINGERS.

Not noted on enlistment record.

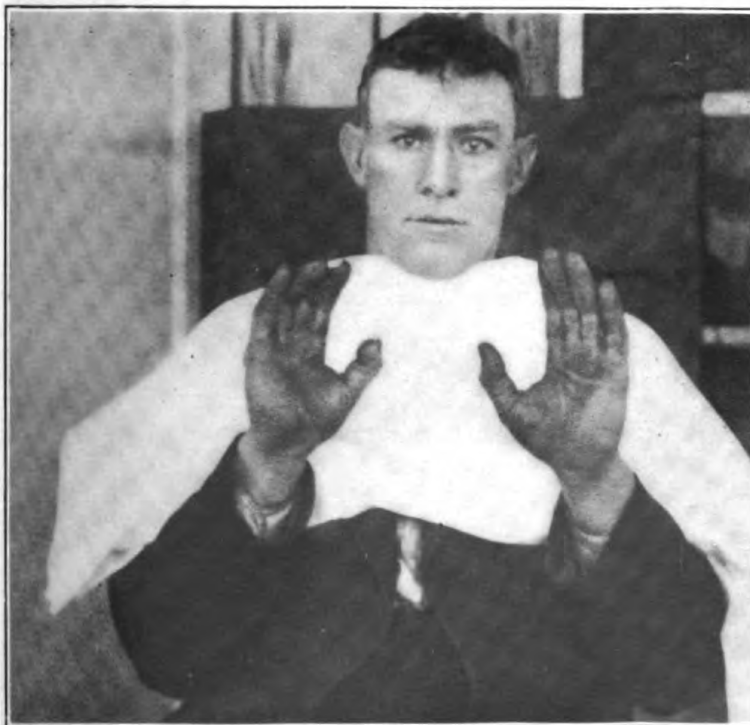


FIG. 10.—DEFORMITY OF RIGHT THUMB.

Not noted on enlistment record. Photograph fails to show deformity of metacarpophalangeal joint, which also exists and was not noted.

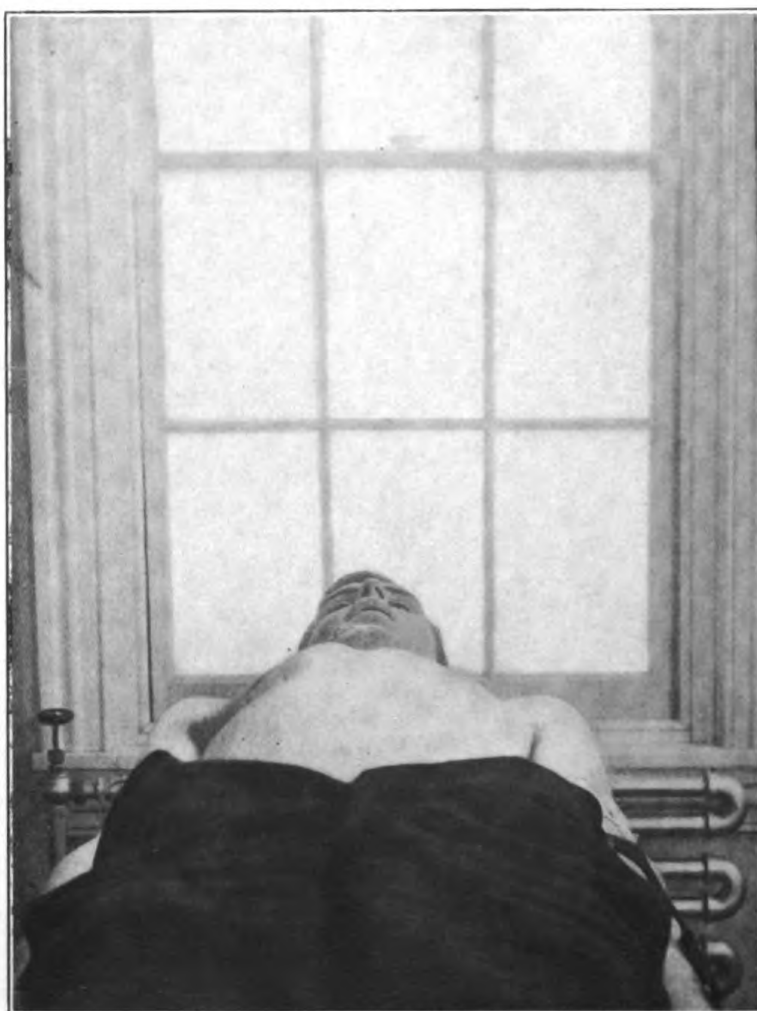


FIG. 11.—ASYMMETRY OF CHEST; NOT NOTED ON ENLISTMENT RECORD.

thus sleep in a compact mass—all in one bed, as it were—and by reason of the beams and piping under the overhead deck, which obstruct the movement of air, and the tendency of warm and foul air to rise and stratify between the hammocks and deck above, the men in hammocks are benefited but little by the means employed for ventilating the berth deck at night.

The question to be considered here is how to overcome the objectionable features of disposition, as noted above, namely, the close head-to-head contact and suspension so near to the deck overhead. The larger ships are high between decks, so high, indeed, that many men are unable to get into their hammocks without the aid of a stepping bench; so that it should be practicable to lower the general level of the hammocks to, or below, a middle distance between decks, for the primary purpose of permitting a freer circulation of air, without unduly obstructing the berthing deck, which would, at the same time, obviate the difficulty of getting into hammocks. The second objection—close head-to-head contact—would be remedied by a general arrangement of the billets in a semicircle or segments of circles, with feet at the center and heads at the circumference, whereby the greatest possible distance between the heads of the sleepers would be obtained, and by otherwise dispersing the billets as widely as the area and form of berthing spaces will permit.

That close head-to-head contact in hammocks is objectionable to many men is manifested by a disposition to sling their hammocks in out-of-the-way nooks, and by sleeping on deck when permitted to do so. And that a general lowering of vitality results from breathing air vitiated to a high degree by this close contact, and, moreover, that throat and bronchial disorders are communicated from person to person thereby, is beyond the question of a doubt. This was strikingly shown in a diphtheria epidemic on board the U. S. S. *Buffalo* on one occasion, and noted in the record of that outbreak. The matter of effecting the changes herein suggested rests, of course, in the hands of executive officers and constructors in the application of the idea and in its practical execution, to whom it should be submitted by medical officers with all the urgency its importance is believed to merit.

THE VALUE OF A CHEMICAL EXAMINATION OF WATER.

By Pharmacist E. R. NOYES, U. S. Navy.

The principal object of the article "The composition of a potable water," which appeared in the October, 1908, issue of the Bulletin, was to demonstrate the following points: That incomplete chemical analyses were not only without value, but on the contrary were dangerous to use, for from such an examination we could easily be led

to pronounce safe a water which was really dangerous and vice versa; that the complete analysis only should be considered, and even then if this is to have any real worth it must be used in a comparative manner; and that when the latter conditions were fulfilled the chemical examination gave information of great value. That the article failed in its mission is evidenced by the appearance of the article "Has the chemical analysis of water practical value to the military medical officer?" in the January, 1909, issue of this publication. It is by answering the various criticisms occurring in the latter article that I hope to make clear those points which are not so in the original, and to also illustrate the real value of a chemical examination.

Objection is made to the application of the term "polluted" to those waters in which the natural processes of oxidation have completely transformed all the animal matter which the water previously contained. The writer of the article under discussion contends that if such a water is polluted or is of doubtful quality then a glass of water to which the same chemical compounds as a result from this oxidation have been intentionally added must also be considered as polluted or dangerous, for these ingredients are no more harmful nor more capable of conveying disease in the one case than in the other, and that they are as harmless when derived from animal matter as when resulting from the oxidation of vegetable material. An important point, then, to be discussed, and if possible settled, is whether the term pollution was improperly used.

That the ingredients ordinarily found in water are not in themselves injurious, no matter from what kind of material they are derived, is too apparent to call for comment. If the contrary impression was given by the original article it was due to the fault of the reader and not the article, for in the seventh paragraph it was clearly stated that these substances are not deleterious.

But would a glass of water containing these salts be at all times relished and at all times free from danger? To determine this, let the following example be quoted: A certain farmhouse was notoriously unhealthy, the inmates at various times having suffered from attacks of typhoid fever. The water used in the house was derived from a well and, as is usually the case in such outbreaks, the water fell under suspicion as being the cause of the disease, and as a consequence a bacteriological examination of it was made to determine if this was the cause of the trouble. The examination resulted in finding the water very satisfactory, or rather not to blame. Carrying the investigation further it was found that in the house there was a water-closet in good working order and the drains of which were said never to become blocked; but where these drains discharged was not known. Upon tracing them, however, it was found that they

emptied into a dry-steyned cesspool. The well and cesspool, the latter not more than 4 yards from the former, were both sunk in loose gravel, the cesspool having no outlet or drain to carry off any overflow. The well yielded an unfailing supply of cool, bright, and sparkling water. A chemical examination of the latter showed a remarkable freedom from organic matter but a very large quantity of nitrates and chlorides. Because of such a composition the opinion was expressed that the water was a concentrated oxidized sewage and that it was undoubtedly derived in large part from the overflow of the cesspool percolating through the loose soil into the well. This view was not at first accepted. When, however, the cesspool was filled up and the drains made to empty elsewhere and the well then promptly failed to supply sufficient water to meet the demands of the house, then those most concerned were convinced that the view advanced must have been correct. In this case the water, after being defiled by the closet, slops, etc., entered the cesspool, overflowed the latter, percolated through the soil, at which time the organic matter was completely oxidized, then entered the well to again be utilized for domestic purposes. Since pollution is defined as uncleanness—defilement to render dangerous to health—how could any term other than “polluted” be applied to this water? Could any one, knowing these conditions, drink this water, which is virtually nothing but a solution of nitrates and chlorides, without a feeling of disgust? Is it a safe water for use since the defiled contents of the cesspool must very soon return to the well?

But as I believe it is better to use as examples those cases which one encounters in his own experience than to quote from the experience of others, let one other illustration be given.

In April, 1907, a water was submitted to me for an opinion as to its quality, and as a result of a chemical examination it was unhesitatingly pronounced polluted. This same water, although I was not aware of it at the time, was examined by others, both prior and subsequent to the above date, and both bacteriologically and chemically. As I will have occasion to refer to them several times, such of their results as were obtainable, together with my own, marked “N,” are for convenience given in the table below.

	July 3, 1907.	July 28, 1907.	Sept. 20, 1907.	Oct. 9, 1908.	Feb. 13, 1909.	Apr. 1, 1907.
						(N.)
Free ammonia	0.08	0.015	0.01	-0.01	0.05	0.035
Alb. ammonia	0.06	0.005	0.005	0.01	0.10	0.04
N as nitrite	0.008	0.018	0.001	None.	Trace.	0.01
N as nitrate	15.00	10.00	12.50	Trace.	8.00	6.40
Chlorine	30.00	28.00	26.00	5.00	39.00	27.00
O. C. P.	1.20	0.48	0.48	1.20	0.84	0.20
B. coli	(a)	None.	None.	(b)	None.	(c)

^aIn 10 c. c.

^bDec. 16, 1908. In 1 c. c.

^cNot looked for.

On inspecting this table it will be seen that the *B. coli* was found on July 3, 1907, and again on December 16, 1908, the former being that on which the *B. coli* was first found and the date on which the water was condemned by those whose results are quoted. It will also be noticed that the water was at all times very free from organic matter, as is indicated by the small quantity of the ammonias and the low oxygen-consuming power; again, it will be seen that a very striking feature of the table is the constant presence, except on October 9, 1908, of large quantities of nitrates and chlorides, this feature giving the picture of a water in which the organic matter has been fully oxidized, or, in other words, a water which contains but little more than nitrates and chlorides. Notwithstanding such a composition the *B. coli*, it will be noticed, was found in abundance in two out of five examinations.

According to the author of the article under discussion it was not justifiable to pronounce this water polluted on April 1, 1907, because of the mere presence of nitrates and chlorides. He contends that such a verdict should have been withheld until a condition such as that found on July 3, 1907, namely, the presence of the *B. coli*, was encountered. But this latter condition did not exist on July 28 or September 20, 1907; it did occur again, however, on December 16, 1908, but not on February 13, 1909.

Now, from the above facts, a fair question which arises is this: This water having very much the same chemical composition on all the dates mentioned, is it reasonable to assume that though polluted on July 3, 1907, and December 16, 1908, it was not polluted, i. e., not dangerous to health, on July 28 and September 20, 1907, and February 13, 1909? I do not think that such could be the case, but instead contend that it was polluted throughout the whole period covered by the analyses, although in a majority of the examinations only nitrates and chlorides, but no *B. coli*, were found. With practically the same chemical composition on April 1, 1907, as on the above dates, would it not be reasonable to suppose that it was just as dangerous at that time as it proved to be but a month or two later?

I pronounced this water unsafe because the quantities of the nitrates and chlorides so far exceeded the normal for the neighborhood that it clearly indicated that the water was receiving an undue amount of sewage or animal matter, and under such conditions there was the greatest danger of the water becoming infected at any moment. That this danger really existed is abundantly confirmed by the bacteriological findings quoted. Was not the term "polluted" justly and properly applied to this water in the opinion rendered on April 1, 1907, and would not a like opinion of any water showing such a deviation from the normal be justified? (This water is No. 5 and its normal No. 4 in the article of October (5), 1908.)

Let us take a glass of distilled water and dissolve in it a quantity of chemically pure nitrates and chlorides and submit this solution to a chemist, under the pretext of it being a water from natural sources of a particular locality, for an opinion as to its quality. Would he not be correct in pronouncing it a dangerous water, for it is only when derived from natural sources that such a solution has any significance?

As "it is highly important to know whether or not there is disease-carrying property" present, the desire for this bit of information forms a sufficient cause to give some consideration to the significance of the usual bacteriological examination.

A sample of water is sent to a bacteriologist for him to determine if it is polluted. If his findings warrant such a verdict, he will pronounce it polluted, for he has found the *B. coli* in a certain volume of the sample. Realizing that the detection and isolation of pathogenic organisms has been proved by an enormous number of experiments to be practically a hopeless task, he has confined his efforts to the more promising field of determining the likelihood of sewage being present. This he can with a reasonable degree of certainty accomplish, provided the sewage be comparatively fresh and in sufficient abundance, by proving the presence of the *B. coli*, for this organism, inhabiting as it does the normal intestine in such enormous numbers, is almost of necessity a denizen of sewage of not too remote an origin. By finding this organism in a small volume of the sample he is fully justified in saying that the water contains a notable quantity of sewage of recent or comparatively recent origin, or, in other words, that the water is polluted. Has he positively demonstrated that the water possesses disease-carrying properties? The mere presence of the *B. coli* or a very large number of other organisms which have no medical significance does not necessarily prove it, for can we not, and do we not, every day drink with impunity water which contains nothing more pathogenic than the organisms found? Has he not simply informed us that the water contains an undue amount of sewage, and as the latter may at any time contain pathogenic organisms, then the water, because of the addition of sewage, may also at any time and without warning, contain them, and is therefore dangerous?

How does this compare with the information gathered from the results of the chemical examination? From the great increase of the total nitrogen and the chlorides over that contained in the normal water of the neighborhood, do we not have positive evidence of the addition of an undue amount of sewage, for the simultaneous increase of these two ingredients can only result from the addition of animal products; and, depending upon the form in which the nitrogen is present, is it not possible to determine whether the offending material

is in a fresh condition or not? Has the bacteriologist given us, and has he attempted to give, any more definite information than that sewage is present, a fact which the chemist has equally as well established? Why, then, can not the same conclusion be drawn from both kinds of examination when both have detected sewage and neither has been able to positively prove the presence of disease-bearing properties? Does common sense and fairness grant to one and deny to another the right, from identically the same circumstantial evidence, to assume as true that which he has not established as a fact?

The question of the forecasting powers and the comparative safety of the conclusions reached in the two methods of examination has been raised and should receive some attention. The bacteriologist from his examination is able to tell us what he finds to be the condition only at the time of his experiments, for, because, he does or does not find bacterial life of a suspicious character is certainly not sufficient evidence to assure us that such a condition existed at a prior date, nor will it warrant the prediction that it is very likely to continue in the future. The chemist, because those ingredients with which he deals are, after once entering water, practically ineradicable therefrom, on looking over the results of his examination is immediately placed in possession of evidence which will indicate that organic matter has been added; whether it is of animal or vegetable origin; if the addition is recent or remote, and if the quantity is large or small. If he finds the organic matter to be of animal origin, and in a fresh state or undergoing chemical changes at the time of his examination, a condition which plainly indicates the presence of fresh sewage, which is always a dangerous ingredient, he is of course justified in pronouncing the water polluted. If, on the other hand, he finds the organic matter fully oxidized, he is in a position to say that sewage has at some time entered the water; but is he justified in saying more than this? The bacteriologist tells us that a water of the latter variety is harmless because, in the course of the oxidation of the organic matter, the harmful bacterial life has been destroyed or reduced to numbers that need not be considered of any significance. The chemist reasons that as in all probability the surface conditions will in the future so change that more rather than less of the offending material will enter this water, and that under such circumstances the soil from which the water is derived is likely at any moment to become so taxed that it can not efficiently perform its functions, infection, or rather the entrance of fresh sewage, is exceedingly probable and the water is therefore dangerous and should by all means be condemned. Whether such reasoning is advisable and correct, and whether such instances ever occur can readily be determined from the examples previously given, these examples being by no means rarities. While the chemist, through chemical means, is not placed in a posi-

tion to detect infection, he does possess information which enables him to inform us of the past history and the present condition of a water, and whether early pollution is not more than a probability. As the bacteriologist can state only what the present conditions are, is he quite so favorably situated as the chemist for detecting impending danger?

Having in a partial manner discussed the relative value of the bacteriological and chemical examinations, it would be well to go into this subject a little more thoroughly and decide if one method should be subordinated to the other.

That there are cases in which pollution can not be detected by chemical means is not to be denied, for a striking example of this kind is to be found in the waters of the larger streams. In these the pollution is certainly of great degree, for a sanitary survey of the situation will easily convince anyone that water gathered from the populous hillsides, such as these streams usually drain, must necessarily contain a goodly quantity of objectionable material, yet owing to its great dilution by rain water, etc., it is practically impossible in many cases to detect it by chemical means. This pollution is often so evident that neither the service of a bacteriologist nor a chemist are required to determine its presence, but the former can readily demonstrate it. As these waters are often the only available source of supply, it is on the bacteriologist that we must rely for information as to the efficiency of the various devices which are used for removing the dangerous contents, for in such cases chemical examinations are valueless. There are also occasions when a water supply has been accidentally and temporarily polluted, as in the cleansing of a well, etc. In a case of this kind the value of a bacteriological examination would again be superior to that of a chemical, as sufficient evidence of a permanent character is not present, and it is the lack of this that places the chemist at a disadvantage. Other examples similar to these could be given, but are not at all necessary for the purposes of argument.

In a temporarily polluted water the bacteriological findings are perhaps positive, while the chemical evidence is not. In such a case the constant lack of chemical evidence induces continued bacteriological tests, and as in the course of the latter it is found that all positive evidence has disappeared, the conclusion of temporary pollution is reached. If it were not for the negative results of the chemical examination and the insistence upon the correctness of its deductions, such a water as this, even though of unquestionable wholesomeness, when gathered under normal conditions, would be mercilessly condemned if a bacteriological examination alone were made.

Just the reverse of the above is well illustrated in either of the waters, but more especially the second, mentioned at the beginning of this article. It was due in this case to the constant finding of chemical evidence of sewage, even though the latter was completely oxidized, that undoubtedly caused the authorities to be suspicious of the water's quality and safety and to keep constant watch for evidence of a condition which the chemist would in all probability, and without hesitation, have pronounced as absolutely certain to occur, had not the chemical evidence been officially subordinated to the bacteriological. I refer to the appearance of those elements which constitute the real danger of water to be used for domestic purposes, namely, the bacteria from the intestinal tract.

The foregoing evidence relative to the value and province of each method of examination should be sufficient, although much more could be given, to convince anyone that instead of subordinating either one method to the other, which is by far the too common tendency to-day, that both should work in harmony, as both are equally important, and that the examination of any water is incomplete which does not make use of both, for whatever is overlooked by one method will without question be detected by the other.

As there seems to be some mystery in connection with the establishment of the purity of a water, a discussion of this subject will perhaps be of some service. It is not sound reasoning to pronounce a water pure because it has been used in the past without untoward effect, for as before stated, polluted waters can be and have been used without harm, for it is only when infection occurs that danger really exists. Unfortunately the history of various epidemics of water-borne diseases furnishes only too many examples of the folly of assuming as certain, as this does, the continuance in the future of the condition of safety that has prevailed in the past. To use a water without harm resulting from it tells us nothing of what the water contains, nor how it compares in composition with others that have been similarly tested. Those most concerned in the establishment of the purity of waters have always followed, and will continue to do so, the very rational plan of pronouncing as the purer that which contains, when compared with others of same locality, the smaller quantity of dissolved substances, especially the nitrogen-bearing ingredients and the chlorides, this plan not differing in any respect from that which is followed in determining the purity of any other substance. This method, unlike the former, takes nothing for granted.

Since it is impossible to find a pure water, when the word pure is used in its strict sense, the efforts of both the chemist and the bacteriologist are directed to finding those waters which contain the smallest quantities of impurities; that is, to point out those which are

less likely to be productive of harm. The chemist would recommend as the better (or the purer, as it is ordinarily understood) of two waters, that which contains the smaller quantity of those two ingredients, the nitrogen-bearing substances and the chlorine; and if in both waters the quantity of these happened to be in any great excess of that which he knows to be the minimal for waters of like kind in the same locality, he would not hesitate to say that both are of poor quality, or that better and safer water can in all probability be obtained. The bacteriologist finding that it is necessary to use 100 c. c. of one water to detect the *B. coli*, and only 1 c. c. of another for the same purpose will, without delay, pronounce the former as the safer and better for domestic use. He, like the chemist, does not in any manner attempt to establish absolute purity, but is content to advise of the relative safety.

With such evidence as has been presented it is hoped that the true value of a chemical examination of water will be appreciated. It is true that a large amount of collateral evidence must be at hand before the results obtained can be given their proper weight, but it is also true that those who are really competent to make the analyses are also in possession of this information. I fully believe that an opinion rendered in accordance with all the facts brought out by and to be used in connection with the chemical examination is equal in value to that arrived at in any other way.

The value of a chemical examination of water to the military medical officer differs in no respect from the value that it has to others who have occasion to make use of such information. If he is, through limited time, as is so frequently the case, able to make or to have made only one or two tests, then the information which he has obtained is practically valueless as a means for determining the quality of the water. Such a procedure as this is ridiculous, and it is due to the employment of this unreasonable method of analysis that has served to deprive the chemical examination of the importance and value which it by right of efficiency possesses. But if he is given the apparatus and that prime requisite, i. e., sufficient time for analytical work and is supplied with all available information, then the chemical examination of water will be of the greatest value and assistance to him.

Having for several years been in constant receipt of queries regarding the quantity of this or that ingredient a good water should contain and what significance this or that substance had, the writer has gained the impression that the true meaning and significance of a chemical examination of water was completely misunderstood. It was the desire to sufficiently explain it so that instead of being a collection of unintelligible figures, as it seemed to be, the result of a chemical examination would become a record from which, if properly used,

information of much value and assistance could be obtained, that led to the preparation of the article for the October, 1908, issue of the Bulletin. As it was intended in that article to deal solely with the chemical side of water examination all reference to the bacteriological feature was studiously avoided, for I believed that to treat of both at the same time would lead to the subordination of either one method to the other when as a matter of fact both are equally important. If, however, this and the original article have succeeded in demonstrating its true value and in placing the chemical analysis upon a substantial basis so that it can be properly used, they have accomplished their purpose. That the chemical examination has been of value in the past and will continue to be so in the future can not well be denied.

PROGRESS IN MEDICAL SCIENCES.

LABORATORY.

A METHOD FOR THE PREPARATION OF FLAT WORMS FOR STUDY.^a

(From the laboratory of the United States Naval Medical School, Washington, D. C.)

By Passed Asst. Surg. O. J. MINK and Hospital Steward A. H. EBELING, U. S. Navy.

We will attempt in our work to describe a simple method for the preparation and preservation of trematode and cestode material for examination by the medical practitioner.

PRESERVATION OF THE GROSS SPECIMEN.

The specimens are best obtained in a clean condition by mixing the fecal material with an amount of warm (37–40°) normal salt solution sufficient to make a thin broth. If the material is obtained at autopsy, as is usually the case with the parasites of animals used in experimental work, the intestinal contents may be washed or scraped off into the salt solution. In this warm solution the worms move about freely, and are more easily seen and transferred—especially small worms such as the *Hymenolepis nana*. With a pair of fine-point forceps the worms are picked up and transferred to a second dish of warm salt solution. In this dish the worms will be found to be in a clean condition, free from mucus and fecal material. Material for sections and for the preparation of mounted segments should be taken from the salt solution and treated with the proper fixatives. The remainder of the gross material may be placed in 50–70 per cent alcohol, with or without glycerin, Zenker's solution, or a 2 per cent solution of formalin. Zenker's solution causes considerable shrinking and a rather marked yellowish discoloration. We considered the formalin mixture much better—the natural whiteness being preserved with little or no shrinkage.

PREPARATION AND SECTIONING OF MATERIAL.

Here it is of great importance to prevent curling or distortion of the worm or segment. This is best prevented by a fixative which kills rapidly, and for this we found Zenker's best. About 3 or 4 inches of the live tapeworm were taken from the salt solution and stretched out on an ordinary glass slide. By means of a pipette the

^a Read at the sixth annual meeting of the American Society of Tropical Medicine, held at the U. S. Naval Medical School, Washington, D. C., April 10, 1909.

slide is rapidly covered with Zenker's solution. The section of the worm straightens out, hardens, and floats on the solution. It may then be transferred to a flat dish filled with Zenker's and allowed to remain here from two to twenty-four hours, according to the convenience of the worker. By cutting a little beyond the part actually desired for work, little end pieces are left which may be grasped with the forceps in subsequent manipulations. Thus the actual segments desired for study need not be touched by the forceps. The subsequent steps include the alcohol-iodine solution, graded alcohols for dehydrating, and other steps up to the melted paraffin. In blocking the specimen it seems better to place the longest and broadest surface downward and later to orient by trimming and mounting as desired. Specimens may be cut in planes (1) parallel with the long broad surface, (2) parallel with the long and perpendicular to the broad surface, (3) perpendicular to the long axis. The first and last methods give a sufficient opportunity to study all parts of the worm. There is no object in cutting sections less than 15 microns, and much time in preparation and examining will be saved if sections 25 to 30 microns are used. If too hard a paraffin is used, it will be found that the ribbons of thick sections break very easily. For 10 to 15 micron sections a 52° paraffin may be used, but for the thicker sections it is better to use a 45° paraffin. We found the most convenient stain to be a rapidly acting purely nuclear haematoxylin.

PREPARATION OF SEGMENTS FOR MOUNTING.

The specimens are washed in normal salt solution (0.85 per cent) and fixed in 2 per cent formalin for a certain time, preferably fourteen to sixteen hours. It is better not to allow the formalin to act over sixteen hours. After this the specimens are transferred to the following glucose medium, which is a slight modification of the Fabre-Domerque medium:

Sirup (glucose 48 parts, water 52 parts)-----	1, 000 c. c. (one thousand).
Methyl alcohol-----	200 c. c. (two hundred).
Glycerin-----	100 c. c. (one hundred).
Camphor (q. s. to keep)-----	100 c. c. (one hundred).

The specimens may be left in this medium indefinitely, although it was found that they cleared sufficiently within four or five hours. In mounting a sufficient amount of Keisser's glycerin jelly is dropped on a slide and the specimen transferred to this, care being taken not to introduce air bubbles. A flamed cover glass finishes the mount. After the glycerin jelly hardens a few coats of gold size applied consecutively around the cover glass furnishes rigidity and improves the general appearance of the preparation. Concave slides are more desirable when the specimen is of uneven thickness or rather thick throughout.

THE FORMALIN METHOD FOR THE CLINICAL ESTIMATION OF AMMONIA IN THE URINE.

By E. W. BROWN, assistant surgeon, U. S. Navy.

This represents original work carried on in the laboratories of the United States Naval Medical School, Washington, D. C.

The estimation of ammonia in the urine, and particularly of the ratio of ammonia nitrogen to total nitrogen, i. e., $\frac{\text{Ammonia-N}}{\text{Total-N}}$, the so-called ammonia quotient, has recently assumed new clinical importance. An increase of the output of ammonia, which involves a change in the ammonia quotient, takes place under conditions of increased intake or fermentation of acid in the organism. Thus, there is a rise in ammonia elimination in the various forms of acid intoxication, particularly in the acidosis of diabetes when large amounts of beta-oxybutyric and diacetic acids are formed. An increased output of ammonia results in order that these acids may be neutralized. The quantitative determination of these acids is long and difficult. The ammonia estimation, on the other hand, is an index of the amount of these acids produced, and therefore is of great value in the diagnosis and prognosis of diabetic acidosis which so frequently precedes diabetic coma.

In the acid intoxication of pregnancy the estimation of ammonia has been put by Doctor Williams^a to the very practical use in the Johns Hopkins Hospital. In cases of pernicious vomiting of pregnancy the ammonia quotient may be increased as high as 20 or even 40 per cent, which in the cases of nervous vomiting, or reflex from the pelvis, and in eclampsia, it is not changed. If the uterus is emptied the ammonia falls at once.

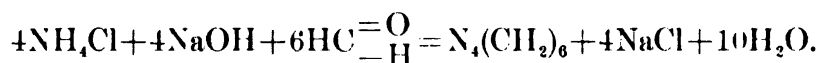
Increased elimination of ammonia occurs in connection with certain hepatic lesions, such as cirrhosis, liver abscess, and phosphorus poisoning. In this class of cases the ammonia is not increased in as marked degree in proportion to the total nitrogen as in diabetic acidosis. Conditions of acidosis, however, are characterized by the very marked change in the ammonia quotient. The ammonia is increased relatively as well as absolutely in proportion to the total nitrogen. The amount of ammonia excreted in twenty-four hours on a mixed diet is normally about 0.7 gram. The ammonia quotient, i. e., $\frac{\text{Ammonia-N}}{\text{Total-N}}$ is normally from 3.5 to 5 per cent. This ratio is quite constant on a constant diet and is not influenced by the amount of proteid. In diabetic acidosis the ammonia for the twenty-four hours may rise to from 8 to 12 grams and the ammonia quotient may amount to 40 or even 60 per cent.

All the recent literature on this subject indicates the great clinical importance of ammonia estimations in the urine. It not only affords

an index to the amount of "acetone bodies" excreted, but is of vastly greater significance than the determination of sugar in pointing out the danger line in diabetic cases.

The established methods for the estimation of ammonia are difficult and require either too long a time or apparatus too complicated to be practical under service conditions. The plan of this paper is the report of the study of a method which largely overcomes these disadvantages.

Principle of the method.—It has long been known that free ammonia reacts with formalin to form hexamethylenetetramine or urotropin as follows: $4\text{NH}_3 + 6\text{H} \begin{smallmatrix} \text{O} \\ \parallel \\ \text{C} \\ \parallel \\ \text{H} \end{smallmatrix} = \text{N}_4(\text{CH}_2)_6 + 6\text{H}_2\text{O}$. Free ammonia does not occur in the urine, but exists in the form of salt, as the chloride, urate, etc. If decinormal NaOH is added to an ammonium salt in the presence of formalin, free ammonia is liberated at once and reacts as fast as it is formed with formalin. The acid radicle of the ammonium salt combines with sodium; the reaction is as follows:



Ronchèse^b has recently utilized this reaction in a method for the estimation of urinary ammonia. Ten cubic centimeters of urine were diluted to 50 c. c. with distilled water and made neutral, using phenolphthalein as the indicator. Fifteen cubic centimeters of 20 per cent commercial formalin, previously made perfectly neutral with sodium hydroxide, are added, and the mixture titrated to the neutral point with decinormal NaOH. The reading on the burette corresponds to the number of cubic centimeters of decinormal ammonia in the sample. The technique of the method appeared so easy and promising that the writer applied it to a number of urinary samples. Ronchèse made high claims for the procedure and reported that known amounts of ammonia, when added to the urine, could be quantitatively recovered. Results in the hands of the writer were unsatisfactory owing to the impossibility of obtaining a sharp end reaction. This was not unexpected as phenolphthalein is well known to fail as a sensitive indicator in the presence of ammonia salts. Repiton^c has described a method similar to that of Ronchèse in which he substitutes acetaldehyde for formalin. He makes substantially the same claims as Ronchèse.

Malfatti^d has recently reported this method in essentially the same form, but without reference to Ronchèse's former paper. The latter^e in a recent article has emphasized that the credit for the process does not belong to Malfatti.

It occurred to the writer that the principle of the method of Folin^f for estimation of the acidity of the urine might be utilized in this connection. Folin found that saturation of the urine with neutral

potassium oxalate greatly sharpened the end reaction in the titration with decinormal NaOH, using phenolphthalein. The method was therefore again studied exactly as described by Ronchèse, except that 15 grams of powdered neutral potassium oxalate were added to the urine and thoroughly stirred before titrating. The end point was brought out much more distinctly, particularly in light-colored urines as in diabetic samples. A series of estimations were carried out and checked by Schaffer's^o vacuum distillation method, a highly accurate procedure. The data are assembled in the accompanying table. The formalin process gives results averaging 20.33 per cent higher than Schaffer's. The modification with potassium oxalate was also carried out with $\frac{N}{20}$, $\frac{N}{10}$ and $\frac{N}{2}$ solutions of pure ammonium chloride. The results agree closely with theory. The results were also controlled by the ordinary distillation method and found to be in satisfactorily close agreement. When the oxalate was not used marked variations resulted as the end point was obscure.

Shortly before the completion of this work Mathison^k reported results from a set of similar experiments. He emphasizes the value of potassium oxalate and finds that the formalin method improved in this way gives results about 15 per cent higher than the vacuum method. He is unable to explain the causes of this discrepancy. Urea, uric acid, creatinin, etc., were added to urine without affecting the ammonia values. Malfatti^d also studied the effect of the ordinary urinary constituents on the method with negative results; in addition he compared its accuracy with the Schlosing and Folin^t methods and in most instances, higher results are obtained.

As the sharpness of the end point still left much to be desired, it occurred to the writer that clearing the urine with subacetate of lead might be of advantage in removing coloring matter before the titration. The excess of lead was removed by potassium oxalate. The results were striking. The end color was now brought out with nearly the degree of sharpness in titrating ammonia in a watery distillate with cochineal. The technique is as follows: About 60 cubic centimeters of filtered urine are treated with 3 grams of basic lead acetate, well stirred, allowed to stand a few minutes and filtered. The filtrate is treated with 2 grams of neutral potassium oxalate well stirred and filtered; 10 cubic centimeters of the clear filtrate are diluted to 50 cubic centimeters with distilled water; a few drops of 1 per cent phenolphthalein solution are added. The mixture will be slightly alkaline or acid. Fifteen grams potassium oxalate are added and stirred. It is exactly neutralized with decinormal NaOH or H_2SO_4 . Twenty cubic centimeters of 20 per cent commercial formalin, previously made neutral, are added, and the solution again titrated with decinormal NaOH to neutralization. Every cubic centimeter of decinormal NaOH corresponds

to 0.0017 gram NH_3 . The quantity of ammonia is then calculated on the basis of the twenty-four hour volume. Known amounts of ammonia added to urine were quantitatively recovered.

The results of this method were also contrasted with the Schaffer process. The accompanying table presents the data, showing that the figures for the formalin method are a little the higher, i. e. an average difference of 6 per cent. That this difference would be of no clinical importance is obvious, for it is only large quantitative changes in the output of ammonia that have significance clinically.

That the clearing of the urine with subacetate of lead removes a substance or substances reacting with formalin and introducing a fallacy in the ammonia estimation is clear. Sorensen¹ has reported that uric acid, which is removed in clearing, reacts with formalin. The writer has estimated uric acid in a number of the samples referred to in the table, but the quantity present accounts for only a small fraction of the differences observed. Hippuric acid, which is not removed by clearing, did not affect the ammonia estimation. It, therefore, can hardly account for the slightly higher results in cleared urines as compared with Schaffer's method. Creatin was not tested, but other workers, referred to above, reported it without influence. It is hoped to study this phase of the subject further in the near future.

A possible fallacy in the usage of this method must be recalled. Sorensen¹ has demonstrated that formalin combines with the amido acids, liberating acid radicals, which may be titrated, thus giving an index of the amount of amido acids. A number of such acids—i. e., glycocoll, alanin, leucin, tyrosin, etc.—were titrated, and, with the exception of tyrosin, were capable of quantitative determination. In the present study leucin and tyrosin were considered and Sorensen's claims confirmed. The important consideration clinically is the extent of occurrence of these acids in the urine. Brugsch and Schittenhelm² in reviewing this subject state that glycocoll is the only amido acid thus far demonstrated in normal urine, and then in very slight amount. Leucin and tyrosin have been shown in cases of acute yellow atrophy, phosphorus poisoning, and in diabetic coma. As Mathison³ says, it is in just those pathological conditions when the output of ammonia is high that large quantities of amido acids are excreted. These bodies replace a portion of urea, so that their significance clinically is in the same direction as ammonia. If the formalin method gives the sum of ammonia and amido acids, the ammonia could be estimated by Schaffer's vacuum distillation method and the amido acids indirectly determined, at least roughly, by difference.

The question arises in the formalin method as to the applicability of indicators not sensitive to ammonium salts. Cochineal and alizarin

red are both highly satisfactory in *aqueous* distillates. A number of trials were made substituting these for phenolphthalein in the above method. They were not found sufficiently sensitive. Rosolic acid, methyl orange, and lacmoid were also equally unsatisfactory, even with the use of potassium oxalate.

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The determinations of ammonia in the urine.

Urine.	Formalin method uncleared.	Formalin method cleared with lead.	Schaffer's method.
Sample 1	0.0586	0.0537	0.0507
Sample 2	.816	.0705	.0673
Sample 3	.0782	.0721	.0697
Sample 4	.0748	.0736	.0694
Sample 5	.0591	.0544	.0501
Sample 6	.450	.0382	.0361
Sample 7	.0599	.0527	.0499
Sample 8	.0221	.0162	.0159
Sample 9	.0629	.0535	.0507
Sample 10	.01275	.0102	.0104
Sample 11	.0599	.0527	.0504
Sample 12	.0501	.0425	.0388
Sample 13	.0476	.0399	.0354
Sample 14	.0411	.0348	.0331
Sample 15	.0642	.0578	.0544
Sample 16	.0493	.0461	.0459
Sample 17	.0331	.0297	.0253
Sample 18	.0546	.0535	.0527
Sample 19	.0433	.0382	.0367
Sample 20	.0577	.0534	.0493
Sample 21	.1470	.1402	.1309
Sample 22	.0690	.0620	.0595
Sample 23	.0476	.0428	.0408
Sample 24	.0535	.0476	.0449

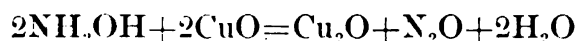
SOME NEW METHODS IN CLINICAL CHEMISTRY.

During the past year certain changes have been made in the laboratory course in clinical chemistry at the United States Naval Medical School. These changes concern the methods of making determination of recognized importance in medical diagnosis, the various tests being recommended for their greater accuracy and being characterized by reasonable simplicity of technique. From time to time as space allows one or more of these tests will be published in this section of

the Bulletin. By this means medical officers throughout the service will be able to keep in practical touch with the latest laboratory developments and the "memoranda to accompany the naval test case and microscopical outfit" may be kept up to date. The methods as published may be considered as having been adopted at the Naval Medical School and may be employed in substitution for the corresponding test described in the test case manual.

BANG'S METHOD FOR THE ESTIMATION OF GLUCOSE IN THE URINE.

Principle.—In this method the copper is reduced in solution. There is no precipitation of the cuprous oxide. A definite excess of copper is used and the amount left over is determined by titrating back with a solution of hydroxylamine hydrochloride from blue to colorless condition.



The Cu_2O is held in solution by the presence of a large excess of KCNS.

Solutions.—1. Copper solution:

(a) 500 gms. K_2CO_3 ; 400 gms. KCNS; 100 gms. HKCO_3 . These three are dissolved in about 1,500 c. c. distilled water at about 60°C . and allowed to cool to room temperature.

(b) 25 gms. CuSO_4 dissolved in about 150 c. c. hot distilled water and, after cooling, gradually poured with stirring into solution "A" and the whole made up to exactly 2 liters.

2. Hydroxylamine solution:

200 gms. KCNS dissolved in about 1,500 c. c. of distilled water, 5.55 gms. hydroxylamine hydrochloride added, dissolved, and the mixture made up exactly to 2 liters. This must be kept in a brown bottle.

Technique.—The urine is first cleared with lead subacetate 3 gms. being added to 50 c. c. of urine, thoroughly stirred and filtered. Excess of lead is removed by adding to filtrate about 3 gms. of potassium oxalate, stirred and filtered. The urine is diluted so as not to contain more than 0.6 per cent sugar; a dilution of 1 to 10 would suffice in the majority of diabetic cases. 50 c. c. of the copper solution are pipetted into a beaker and 10 c. c. of the urine added. The beaker is covered with a watch glass. It is now heated just to boiling, boiled gently for three minutes, and rapidly cooled under tap water. It is now titrated with the hydroxylamine solution until colorless. The copper and hydroxylamine solutions are so made up that 1 c. c. of one exactly equals 1 c. c. of the other. If there is any difference a factor may be used. By consulting the table the amount of sugar in milligrams corresponding to number of c. c. of hydroxylamine solution used is given.

Example.—Urine diluted ten times. 9 c. c. of hydroxylamine solution required. Table shows that this corresponds to 44.7 mgs. glucose. 44.7 mgs. in 10 c. c. of urine diluted ten times or 447 mgs. in 10 c. c. of original urine, or 4.47 per cent.

COMPLETE REDUCTION TABLE.

Bang's method for estimation of glucose in urine.

Hydroxylamine solution used.	Sugar in mgr.	Hydroxylamine solution used.	Sugar in mgr.	Hydroxylamine solution used.	Sugar in mgr.
0.75	60.0	17.00	33.9	33.50	14.9
1.00	59.4	17.50	33.3	34.00	14.4
1.50	58.4	18.00	32.6	34.50	13.9
2.00	57.3	18.50	32.0	35.00	13.4
2.50	56.2	19.00	31.4	35.50	12.9
3.00	55.0	19.50	30.8	36.00	12.4
3.50	54.3	20.00	30.2	36.50	11.9
4.00	53.4	20.50	29.6	37.00	11.4
4.50	52.6	21.00	29.0	37.50	10.9
5.00	51.6	21.50	28.3	38.00	10.4
5.50	50.7	22.00	27.7	38.50	9.9
6.00	49.8	22.50	27.1	39.00	9.4
6.50	48.9	23.00	26.5	39.50	9.0
7.00	48.0	23.50	25.8	40.00	8.5
7.50	47.2	24.00	25.2	40.50	8.1
8.00	46.3	24.50	24.6	41.00	7.6
8.50	45.5	25.00	24.1	41.50	7.2
9.00	44.7	25.50	23.5	42.00	6.7
9.50	44.0	26.00	22.9	42.50	6.3
10.00	43.3	26.50	22.3	43.00	5.8
10.50	42.5	27.00	21.8	43.50	5.4
11.00	41.8	27.50	21.2	44.00	4.9
11.50	41.1	28.00	20.7	44.50	4.5
12.00	40.4	28.50	20.1	45.00	4.1
12.50	39.7	29.00	19.6	45.50	3.7
13.00	39.0	29.50	19.1	46.00	3.3
13.50	38.3	30.00	18.6	46.50	2.9
14.00	37.7	30.50	18.0	47.00	2.5
14.50	37.1	31.00	17.5	47.50	2.1
15.00	36.4	31.50	17.0	48.00	1.7
15.50	35.8	32.00	16.5	48.50	1.3
16.00	35.1	32.50	15.9	49.00	0.9
16.50	34.5	33.00	15.4		

For each 0.1 c. cm. hydroxylamine solution used in excess of the quantity indicated in the table, 0.1 mgr. sugar is to be subtracted from the sugar equivalent between the amounts 49 and 15, and 2 mgr. from the equivalent between 15 and 1.

THE EDESTAN METHOD FOR THE ESTIMATION OF PEPSIN IN STOMACH CONTENTS.

Principle.—Edestin is a vegetable protein belonging to the class of globulins. In the presence of HCl it is changed to a body known as edestan; this is precipitated on the addition of NaCl. If the edestan has been completely digested by pepsin no precipitation occurs. Increasing quantities of stomach contents are added in series to a fixed quantity of edestin and the point determined at which digestion is complete. The pepsin activity is expressed in pepsin units. The value is normally about 100.

Solutions—

1. HCl, 0.1 per cent.
2. Edestin, 1 part in 100 in 0.1 per cent HCl.
3. NaCl saturated.

Technique.—Two cubic centimeters of solution 2 are added to each of eight small test tubes numbered in order. The filtered gastric contents is diluted twenty times with solution 1. To test tubes 1 to 6, inclusive, are added with bacteriological pipette, 0.1, 0.16, 0.25, 0.4, 0.64, and 1 c. c., respectively, of the sample. Tubes 7 and 8 serve as controls. After standing at room temperature for one-half hour, 0.3 c. c. of solution 3 are added to each tube except No. 8. Observe in which tube there is no precipitate, which indicates complete digestion. Tubes 7 and 8 are used for comparison. In cases of an acidity, dilute the sample only ten times.

Example.—Tube containing 0.25 c. c., no precipitate: $\frac{0.25}{2 \times 2} = \frac{1}{160}$ or sample contains 160 pepsin units.

CHEMISTRY AND PHARMACY.

Asst. Surg. E. W. BROWN and Pharmacist P. J. WALDNER, U. S. Navy.

NONNE, M. and APELT F. Concerning the fractional precipitation of albumin in the spinal fluid of normal cases luetics, functional, and organic nervous diseases and their bearing upon the differential diagnosis of dementia paralytica, tabes dorsalis, tertiary, and late syphilis. (From the General Hospital, Hamburg-Eppendorf) Arch. f. Psych. und Nervenkr., 1907, Bd. 18, M. 2, S. 433-460.

This represents valuable and important work, with reference primarily to former investigations. By the author's adopted technic, 2 c. cm. saturated neutral reacting ammonium-sulphate solution were mixed in a test tube with 2 c. cm. of the spinal fluid tested for its reaction. After three minutes a second test tube with untreated fluid was placed beside the first tube to see whether the test results negatively or whether it shows traces of opalescence or turbidity. Now, filtering the mixture, 1 to 2 drops of acetic acid were added, and it was boiled. Thereby opalescence or turbidity appeared in the precipitate examination (160 fluid tests). Besides this fractional precipitation, the total albumin content was ascertained by Nissel-Esbach and the zytological investigation undertaken.

From the results, it is seen, the authors (in conformity with Nissel, Henkel, Cimbald, Hoche) have found the total albumin content of the cerebro-spinal fluid increased in most cases of progressive paralysis. All cases, including early cases, gave a positive reaction by the three-minute ammonium-sulphate test; also in those where zyto diagnosis was contrary. In normal and neurasthenic cases the test always gives a negative result, even though they have recovered from syphilis and show lymphocytosis. In tertiary lues, on the contrary, the

cerebro-spinal fluid yielded opalescence in all 11 cases. The three-minute ammonium-sulphate test is thus a much finer test method than zytodiagnosis, especially in conditions of differential diagnosis, when it is necessary to determine if a specific treatment is denoted.

In tabes, zytodiagnosis gives in 95 per cent of the cases a positive result (lymphozytose), the increase of total albumin is shown in 55 per cent of the cases, the three-minute ammonium-sulphate test gives a clear positive reaction in 90 per cent.

A disturbing result obtains in four nonmetasyphilic cases a positive precipitation (3 cases of conus and cauda equina, 1 case of uremia).

GEEHNUYDEN, H. C. Quantitative determination of several sugars in the presence of each other in diabetic urines. (Physiol. Inst. Univ., Christiania.) Z. anal. Chem. 48, 137-63.

Equations are given by which mixtures of 2 of the following sugars, glucose, fructose, and maltose may be estimated by two determinations. These determinations are two of the following: Reduction with Knapp's or Fehling's solutions, polarization before inversion, polarization after inversion, polarization before fermentation, and polarization after fermentation. Similarly, 3 sugars may be determined in admixture by making 3 determinations. Experiments are recorded which show the determination of the above-named sugars with empirical corrections which must be applied to the theoretical equations.

NOGUCHI, HIDEYO. The butyric reaction for syphilis in man and in the monkey. (Rockefeller Inst. Med. Research, N. Y. City.) Proc. Soc. Exp. Biol. Med., 6, 51.

For testing the cerebro-spinal fluid, 1 or 2 parts (0.1-0.2 c. c.) of spinal fluid are mixed with 5 parts of a 10 per cent butyric-acid solution and heated to a brief boiling. One part of a normal NaOH solution is quickly added and the whole boiled for a few seconds. The presence of an increased content of protein in a spinal fluid is indicated by the appearance of a granular or flocculent precipitate, which gradually settles under a clear supernatant fluid. The granular appearance of the precipitate means a positive reaction for syphilis or parasyphilitic affections. This test is a more delicate indicator than the Wassermann reaction. For testing blood serum, 1 part (0.5 c. c.) of clear serum is mixed with 9 parts of one-half saturated solution of $(\text{NH}_4)_2\text{SO}_4$. When precipitation is complete the mixture is centrifugalized and the supernatant fluid removed by decantation. The deposit is redissolved in 10 parts (5 c. c.) of 0.9 per cent salt solution, and 1 part of the solution (0.5 c. c.) mixed with an equal part of a 10 per cent butyric-acid solution. A negative reaction after heating indicates either the absence of syphilitic infection or a successful

cure of the disease. A positive reaction in the blood serum is non-specific for syphilis, because a similar reaction can be obtained in certain other diseases.

VAN LEERSUM, E. C. **Excretion of amino acids in pregnancy and after parturition.** Leiden. *Biochem. Z.* 11. 121-136.

By Pfaundler's method for determining the amino acids in urine (*Z. physiol. Chem.*, 30, 75), improved by precipitating the excess of phosphotungstic acid with a 10 per cent KCl solution before distilling the NH_3 , 2.7 to 7.7 per cent total N in amino acids in healthy urine is found. In 26 cases studied in pregnancy and after parturition, 10 showed 10 per cent or more of total N in amino acids. The highest value is found in most cases before parturition. By feeding amino acids to healthy men and pregnant women a decided difference in tolerance is observed in both. A man excreting 2.7 per cent amino acid N when fed 5 g. glycocoll excreted the next day 5.8 per cent amino acid N. Another man excreting 5.9 per cent amino acid N, when fed 10 g. glycocoll excreted in the two succeeding days 3.8 per cent and 7.5 per cent amino acid N.

ENGEL, K., and ORSAG, O. **The relation between the protein content of the blood serum and that of serous fluids.** *Z. klin. Med.* 67. 175-183.

The refractive index of the blood serum and of the contents of a blister caused by the application of a cantharides plaster was determined. The size and concentration of the plaster or the amount of stimulation made no difference. Serum with a high protein content always gave an exudate richer in protein than serum with a low protein content. The protein content of nephritic and cachectic transudates was lower than that of those caused by stagnation. The difference in the refractive index of serum and œdema fluid was greater in nephritis than in stagnation, showing that the permeability of the capillaries was increased for water only and not for protein. In many cases of uranum nephritis the capillaries were permeable for protein also. In certain cases of anemia the capillaries were temporarily almost perfectly permeable for protein.

BANZHAF, E. J. **The further separation of antitoxin from its associated proteins in horse serum.** (Research Lab., Dept. Health, N. Y. City). *Proc. Soc. Exp. Biol. Med.*, 6 advance sheets.

Antitoxin serum was heated in closed containers at 57°. After cooling to room temperature it was saturated with NaCl solution, and filtered twelve hours later. The filtrate showed an increase of antitoxin units, per g. protein, of 35 per cent after six hours heating; increasing up to 53 per cent after forty-eight hours. After heating seventy-two hours the increase was only 52 per cent. On separating the remaining unconverted albumin, the increase of antitoxin units,

per g. protein, was 60 per cent after six hours heating, increasing up to 78 per cent after forty-eight hours. Citrated plasma under the same conditions gave practically the same results. Gibson's anti-toxin globulin solution showed an increase of 37 per cent after six hours heating; increasing up to 54 per cent after twenty-four hours.

SURGERY.

Surgeons C. F. STOKES and RAYMOND SPEAR and Passed Asst. Surg. H. W. SMITH, U. S. Navy.

BROWN, GEORGE S. **The Hodgen splint.** *Journal Surgery, Gynecology, and Obstetrics*, Vol. IV, No. 5.

In this paper Doctor Brown describes an improved Hodgen splint for the treatment of fractures of the thigh or other painful affections of the lower extremity, and emphasizes the important features of this little known and less appreciated apparatus.

This splint is particularly adapted to the peculiar conditions under which naval surgeons work, and should be employed in the treatment of shell wounds of the lower extremity, whether the bones are injured or not. It is easy of application, can be made anywhere, is cheap and readily stowed, taking up little room. The results attainable are marvelously good, and the patients are made comfortable at the outset. In infected compound fractures, such as follow shell wounds, the frequent necessary dressings can be made with little discomfort to the patient. Few assistants are required, as the part is suspended in the apparatus during the manipulations indicated.

The merest tyro in surgical mechanics can improvise a suspension point and adopt simple measures on board ship to make the apparatus as efficient in a swinging cot or fixed bunk as in a bed on shore.

It is important that the point of suspension be at least 6 feet from the bed.

The improved splint is made as follows: Secure a piece of three-sixteenths-inch iron rod or No. 4 wire, long enough to reach from the perineum to 2 inches below the sole of the foot, across the sole of the foot to the outer side (4 inches), and up the outside of the extremity to a point opposite the perineal end. The foot turns are rectangular, and each is equipped with a perpendicular loop of stiff wire, 2 inches high, securely soldered to the frame. The suspension cords are attached to the frame by four rings, the two above placed 7 inches below the perineal end, the two lower from 14 to 16 inches further down, as shown in the illustration. The upper ends of wire are turned over to form small loops into which an arched spanner is secured, one end only being permanently fixed, the other a hook to facilitate application of the splint.

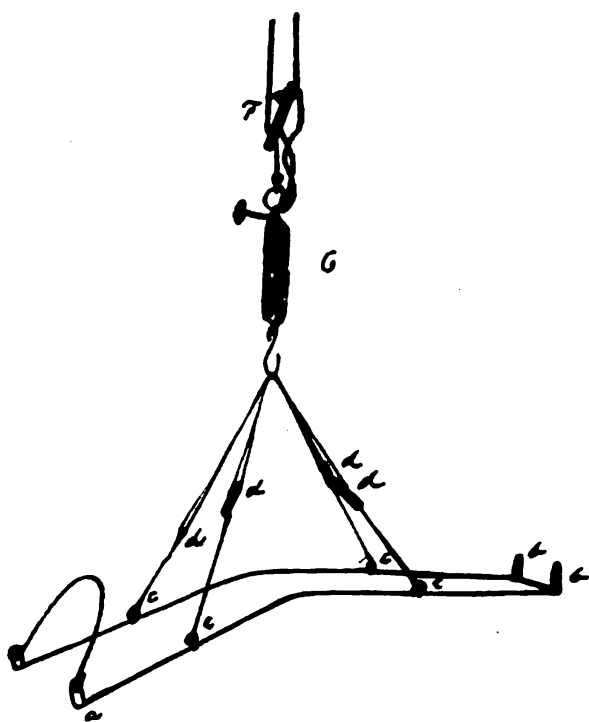
Brown replaces the bandages of the original Hodgen splint with either heavy unbleached muslin or light canvas, which is secured to

the frame by means of safety pins, making adjustment easy and accurate. Riding up or down at the ends is prevented by securing the hammock to the loops and rings of the frame. The frame may be given a gentle bend at the knee-joint level.

The leg is shaved and a strip of zinc oxid adhesive plaster from 2 to 3 inches wide, extending from 2 inches above the knee along the leg to 2 inches below the malleoli, is applied on each side of the limb. The plaster ends beyond the malleoli are narrowed by folding. To each of these ends a heavy unbleached muslin bandage is pinned, and the ends of the bandage are passed through the perpendicular loops in the frame and ties opposite the sole of the foot.

Brown's suspension device is ingenious and simple. He uses $\frac{1}{8}$ -inch unyielding cord with small hard-wood tent blocks for adjustment

and fixation. At the ceiling he employs a wheel pulley through which is led the principal suspending line, made of sash cord, and it too is equipped with a tent block. This sash cord is secured to a spring scale below while the smaller suspension cords are attached to the spring scales, as shown in the illustration. The main suspension cord should fall at an angle of from 20 to 30°, and the foot of the bed be elevated from 6 to 10 inches. With the bed horizontal and the suspension cord perpendicular note the reading of the



The Hodgen splint.

spring scales. The difference between this reading and the reading with the apparatus in position for treatment will give approximately the amount of traction being made. This should be varied according to the age of the patient and the nature of the case. In fractures of the femur eversion is corrected by elevating the outer side of the frame by means of the small tent blocks, supplementing this with cotton pads laid along the outer side of the limb. By adding 10 inches to the length of the splint and turning it up at the lower end, the foot can be fixed and the field of usefulness in leg and foot lesions be thus materially broadened.

Every ship and hospital should be equipped with this apparatus. The results merit its general adoption.—(C. F. S.)

CRILE, G. W. *Surgical anemia and resuscitation.* Am. Journ. of Med. Sciences, April, 1909.

Under the title of "surgical anemia" Crile discusses collectively the effects of shock, collapse, hemorrhage, and similar states on various organs, particularly the central nervous system; and then considers as a corollary the treatment of the conditions caused.

In hemorrhage and in shock the blood pressure may be so low as to cause temporary damage to the central nervous system. * * * Bearing in mind its grave consequences, anemia should not, if possible, be permitted beyond a certain degree. Should other measures fail, the direct transfusion of blood is, in uncomplicated cases, virtually a specific remedy and prophylactic. But in cases of apparent death, transfusion is not adequate. In these extreme cases centripetal arterial infusion with adrenalin combined with rhythmic pressure on the chest seems to be a more effective method (of resuscitation) than that by the use of stimulants, nitroglycerin, intravenous infusion, electricity, needling the heart, and even of direct cardiac massage. * * *

There are definite histological changes following anemia; in estimating, however, probable damage and the likelihood of successful recovery it must be borne in mind that not only the various tissues and organs of the body but the various component histological elements have an unequal endurance of anemia. Bone, connective tissue, muscle, skin, abdominal, and thoracic viscera, special glands, and the heart and blood vessels endure anemia many times longer than will the central nervous system. The medulla resists the effects of anemia much better than the cerebrum; the higher the function, the greater is the susceptibility to anemia. There are degrees of anemia and hence degrees of resuscitation; it is quite possible to revive all the functions except the psychic and for the patient in such case to present all the phenomena of a decerebrate. Resuscitation, then, to be effective, must be timely; i. e., it must anticipate irreparable damage to the central nervous system. Timely resuscitation can only be done by having ever in readiness the materials needed for the technique.

In dogs killed by chloroform the limit of recovery after a total anemia of the central nervous system seems to be slightly under seven minutes, and the human heart, at least, apparently responds even more readily than the heart of a dog. After apparent death, the resumption of the heart beat is dependent more on the pressure in the coronary arteries than on the fluid used to produce such pressure; hence the use of adrenalin in salt solution, and its introduction centripetally via an artery to avoid its excessive dilution or stasis in the pulmonary circulation, results which would follow its injection into a vein.

In human resuscitation the technique is as follows:

The patient in the prone(?) position is subjected at once to rapid rhythmic pressure upon the chest, with one hand on each side of the sternum. This pressure produces artificial respiration and a moderate artificial circulation. A canula is inserted toward the heart in an artery. Normal saline, or the most suitable solution available, is infused by means of a funnel and rubber tubing. But as soon as the flow has begun the rubber tubing near the canula is pierced by the needle of a hypodermic syringe loaded with 1 to 1000 adrenalin chloride and 1 to 2 c. c. (15 to 30 minims) is at once injected. Repeat the injection in a minute if needed. Synchronously with the injection of the adrenalin the rhythmic pressure on the thorax is brought to a maximum. The resulting artificial circulation distributes the adrenalin which spreads its stimulating contact with the arteries bringing a wave of powerful contraction and producing a rising arterial, hence coronary, pressure. When the coronary pressure rises to, say, 40 mm. or more, the heart is likely to spring into action. The first result of such action is to spread still further the pressure-raising adrenalin, causing a further and vigorous rise in blood pressure, possibly even doubling the normal. The excessively high pressure is most favorable to the resuscitation of tissue, especially of the central nervous system. Just as soon as the heart beat is established the canula should be withdrawn, first, because it is no longer needed, and second, because the rising blood pressure will drive a torrent of blood into the tube and funnel. Unless there has been hemorrhage, the only object in the use of saline infusion is to serve as a means of introducing the adrenalin into the arterial circulation toward the heart. Bandaging the extremities and abdomen tightly over masses of cotton is very useful.—(H. W. S.)

KEITH, A. **Mechanism underlying artificial respiration.** *Lancet*. March 13, 20, and 27, 1909.

Keith reviews historically and critically the various methods practiced since the foundation of the Royal Humane Society in 1774. Descriptions of the two methods affording the largest respiratory exchange are of interest.

Schafer's method: The subject is placed face downward, his chest resting directly on the floor. The operator kneels astride the prone subject and places his hands over the lower ribs (tenth, eleventh, and twelfth) on each side of the spine. To produce the respiratory movement the operator, keeping his arms outstretched, brings the weight of his body to bear on the lower dorsal region of the patient. A weight varying from 50 to 90 pounds is thus applied. When the operator applies his weight to the subject's back and thus produces

expiration, the head and chest are seen to move forward along the floor away from the operator to the extent of from 10 to 20 mm. The forward movement is due to the fact that the subject's body rests on the lower part of the sternum and costal cartilages of the longest ribs, chiefly the fifth, sixth, seventh, and eighth. These parts form the fulcrum on which the body moves. The longest ribs, already depressed to an expiratory position and set very obliquely to the axis of the spine, serve as levers on which the trunk rides forward when the operator applies his weight to the spine. In Schafer's expiratory manipulations the lungs are compressed, first, by the abdominal viscera—especially the liver, spleen, and stomach, which are situated immediately under the operator's hands—being powerfully compressed and forced against the diaphragm and lungs; second, the flattening of the anterior wall of the thorax, formed by the yielding costal cartilages; and, third, by the ribs being thus brought into a position of ultraexpiration and the chest compressed from back to front, although it is widened from side to side. The recoil which occurs when the operator's weight is withdrawn and causes an inspiration to occur is due to, first, the strain thrown on the ribs and their costo-vertebral ligaments and ligaments of the spine, for there is a bending downward of the spinal column in the dorso-lumbar region; second, the recoil of the abdominal viscera to their normal position; and, third, the gradual unbending of the costal cartilages.

Inspiration thus results from the rebound which follows over-compression. Also a powerful impetus is given to the blood content of the abdomen.

In 1897 Brosch modified the Sylvester method as follows: He raised and extended the arms by the patient's head exactly as Sylvester recommended, but in place of stopping the movement after the first degree of traction had been exercised, he used a considerable degree of force to continue the movement until the arms actually touched the table or ground on which the supine patient was placed. At the end of this movement the body is arched upward so that it rests on the ground only at the shoulders and at the heels. The spine is overextended. With the withdrawal of the operator's force the body recoils on the ground, and the chest at the same time begins to collapse. The expiratory movement is completed by forcing the patient's arms against the chest, not toward the lateral aspects as advised by Sylvester, but directly over the sternum and yielding costal cartilages which are forced inward so as to compress the lungs and heart. Meyer and Loewy have recently (1908) carried out experiments on the efficiency of the Brosch-Sylvester method. They found that they could fill the lungs with from 1,000 to 3,000 c. c. of air with each movement (Schafer's method 300 to 400 c. c.) and effect a respiratory exchange

varying from 7,000 to 16,000 c. c. per minute; while Schafer finds that he can produce a respiratory exchange (per minute) of 5.850 c. c. with his method, an amount which he regards as amply sufficient for the purposes of resuscitation.

In connection with Crile's studies on resuscitation it is interesting to note that both the above methods furnish a rhythmic, although slow, compression of the thorax, and that Crile's chief measure of injecting adrenalin centripetally is practicable at the same time. A sterile irrigating apparatus, sterile saline, and a hypodermic syringe may easily be kept ready at all times.—(H. W. S.)

HENDERSON. **A new theory of surgical shock.** Am. Journ. of Physiology. April 1, 1909.

Henderson, as a result of his laboratory studies, presents a new theory of shock following laparotomy. He considers that acapnia (diminution of CO₂ in the blood) is a factor in the reflex inhibition, which is a characteristic of shock. The carbon dioxide may be diminished generally by hyperpnœa, or locally, in the case of the intestines, by abnormal exposure to atmospheric influences. He found, further, that restoration of the normal carbon dioxide supply of the body was therapeutically effective in all save the extreme stages of acapnial shock.

The reviewer does not believe that the symptoms of shock, or even of that one form which follows laparotomy, can be successfully ascribed to acapnia alone; but these investigations do raise acapnia to recognition as a weighty factor in the production of shock and to an importance commensurate with temperature, operative trauma, and other factors. The practical value of the study lies in the renewed emphasis laid on the importance of avoiding undue exposure of the abdominal viscera during operation, whether this is brought about by shortening the time of exposure, by adopting expedients other than evisceration, or by wrapping the intestines in sterile rubber dam, as proposed by Monks.—(H. W. S.)

SAUERBRUCH. **Carbon dioxide snow in the treatment of angioma.** Zentrbl. f. Chir., 1909. XXXVI. 1.

Sauerbruch details his experience with Ochsner's method of freezing vascular growths with carbon dioxide snow. There are several methods used in this country for making molds of snow, but the author apparently prefers the simple device of passing a stream of the gas through a piece of gauze, on which is formed snow having a temperature of -79° C. A small piece of this snow, handled with

reasonable care, is placed upon the skin and allowed to remain in contact ten to twenty seconds. The treatment is repeated at intervals of eight or ten days. The angiomas usually disappear without leaving any scar.

Large angiomas and epitheliomas may require an application of thirty or forty seconds' duration, which is followed by sloughing and cicatrization. The method is said to be painless. The therapeutics of freezing and the history of its application in medicine are treated by Jackson and Hubbard in the Medical Record of April 17, 1909.—(H. W. S.)

CODMAN, E. A. *Bursitis subacromialis, or periarthrititis of the shoulder joint. (Subdeltoid Bursitis.)* Bost. Med. and Surg. Journal, October 22 to December 3, 1908.

Codman, in a most painstaking monograph, discusses his experience and studies in connection with 75 cases of subacromial bursitis. He treats systematically the anatomy of the lesion, its pathology, symptoms, treatment, and prognosis. Treatment is given a large share of the space, with illustrative, detailed case reports, probably in order to determine a rational basis from his experience for the treatment of individual cases. The monograph is somewhat of the nature of an argument to establish the importance of the subject and should be read at length. The author's summary is as follows:

1. The subacromial bursa and the supraspinatus muscle are of essential value in abduction of the arm.
2. Lesions of the subacromial bursa and of the tendon of the supraspinatus are the common causes of stiff and painful shoulders.
3. Many cases which pass under the diagnosis of contusion of the shoulder, neuritis, periarthrititis, circumflex paralysis, and muscular rheumatism are in reality due to lesions of these structures.
4. The final prognosis of these cases is good, but when pain is severe, or disability is great, relief may be obtained by a simple operation of little danger.

Other recent and accessible references are:

Codman, Boston Med. and Surg. Journ., May 31, 1906; Painter, Boston Med. and Surg. Journ., March 21, 1907; Baer, Johns Hopkins Hosp. Bull., June, July, 1907.—(H. W. S.)

LE BROcq, C. N. *Report on the local anesthetics recommended as substitutes for cocaine.* (Therapeutic committee of the British Med. Assn.) Brit. Med. Journ., March 27, 1909, p. 783.

In this investigation the points to which especial attention was paid were those laid down by Professor Braun as requisite characteristics of local anesthetics, and the drugs are compared under the headings of his postulates.

1. *Solubility in water.*—Acoine, holocaine, anaesthesine, orthoform, and beta-eucaine were rejected from further examination, since they did not comply with the desirable standard of 2 per cent solubility.

2. *Sterilization of solutions.*—Stovaine, novocaine, beta-eucaine lactate, tropacocaine, alypin, and nirvanine form permanent solutions which withstand sterilization at 115° C.

3. *Local anesthetic properties.*—Stovaine has a more powerful anesthetic action, weight for weight, than any of the local anesthetics. Alypin, beta-eucaine lactate, novocaine, and tropacocaine have anesthetic properties about equal to cocaine. Nirvanine is inferior to cocaine.

4. *Toxicity.*—Alypin has a higher toxicity than cocaine. Nirvanine is only slightly less toxic. If the toxicity of cocaine be represented by 1, the toxicity of novocaine will represent 0.490; of beta-eucaine lactate, 0.414; of stovaine, 0.625.

Only four drugs, namely, stovaine, novocaine, tropacocaine, and beta-eucaine lactate complied with the two postulates (*a*) a lower degree of toxicity than cocaine in proportion to its local anesthetic power, and (*b*) sufficient solubility in water; the solution should be stable—that is, it should keep without deterioration and be capable of sterilization by boiling. These four only were studied further.

5. *Irritant action on tissue.*—In 10 per cent solution, stovaine was followed by sloughing; beta-eucaine lactate, by sloughing; tropacocaine, by sloughing; after novocaine, the part showed no swelling, no hyperemia, and remained normal.

6. All are compatible with adrenalin.

Of the drugs considered, novocaine was found to be the most satisfactory for general use; its anesthetic action is equal to that of cocaine, and its toxicity and general destructive powers on the tissues are very much less.—(H. W. S.)

MCCARRISON, ROBT. Further researches on the etiology of endemic goitre. Quarterly Journ. of Med., April, 1909.

The author's previous investigations led him to suspect that the active principle in the production of goitre existed in suspension in goitre-producing waters. To test this hypothesis and further to determine the nature of the suspended ingredient, he carried out a number of experimental investigations on men. The results of the research are summed up:

1. Goitre can be experimentally produced in man by the administration of the matter in suspension separated by filtration from waters which are known to be goitre producing.

2. Goitre can not be so produced when the suspended matter is boiled.

3. The disease is due, therefore, not to the mineral but to the living component of the suspended matter, in other words, to a living organism of disease.

4. The incubation period of experimentally produced goitre is thirteen to fifteen days.

5. Goitre can be cured by the administration of intestinal antiseptics (thymol). It is probable, therefore, that the organism which is the cause of the disease is parasitic in the human intestine.

6. The feces in most cases of goitre in Gilgit (Kashmir) show a plentiful amebic infection, but whether the disease is due to this infection has not been determined.—(H. W. S.)

HALSTEAD, W. S., M. D. Auto and iso transplantation, in dogs, of the parathyroid glandules. *Journal of Experimental Medicine*, Vol. XI, No. 1, 1909.

As early as 1892 v. Eiselsberg made transplantations of parathyroid, which were not only successful morphologically, but functionally. Of course the interpretation could not be even surmised until four years later when Gley, Vassale, and General discovered the vital function of these glands. The first functional proof by transplantation was made by Leischner, who reported his results in the "*Archiv für Klin. Chir.*, 1907-84-208."

Doctor Halstead's work was begun in 1906 and was continued up to the present time; it was undertaken with a view to determine the course to be pursued by the surgeon when a parathyroid gland has been accidentally removed or deprived of its blood supply.

Among the many important facts learned in this series of experiments are that the transplanted parathyroids do not survive if other (parathyroid) glands are functioning; that only sufficient function is restored to partially overcome the symptoms of parathyreopriva; that as a collary to the first, if parathyroid deficiency (be not) produced (or does not exist) at the time of operation, the grafts will not live; and that, if glands are roughly handled, there may be symptoms of parathyreopriva.

After citing his cases, some sixty or more, he gives the following summary:

1. The autotransplantation of parathyroid glandules into the thyroid gland and behind the musculus rectus abdominis has been successful in 61 per cent of the cases in which a deficiency greater than one-half has been created.

2. In no instance has the autotransplantation succeeded without the creation of such deficiency.

3. Isotransplantation has been uniformly unsuccessful.

4. Parathyroid tissue transplanted in excess of what is urgently required by the organism has not lived.

5. One parathyroid auto-graft may suffice to maintain the animal in good health and spirits for many months, and possibly for years.

6. Excised or deprived of their blood supply in the course of operation upon the human subject, parathyroid glands should, in the present state of our knowledge, be grafted, and probably into the thyroid gland.

7. Complete excision of the thyroid lobes in dogs may be well borne for a year or more. The myxœdema which usually has manifested itself within a few weeks has not increased after the first few months; it may subsequently diminish with the hypertrophy of accessory thyroids.

8. Parathyroid tissue is essential to the life of dogs, as has been conclusively proved by the result of excision of the sole sustaining graft.—*Surgeon H. C. Curl.*

HALSTEAD, W. S., M. D. **Partial, progressive, and complete occlusion of the aorta and other large arteries in the dog by means of the metal band.**—*Journal of Experimental Medicine*, Vol. XI, No. 2, 1909.

The work was begun for the purpose of learning a method which would enable the surgeon to safely occlude the abdominal aorta in the hope thereby of curing aneurisms of this vessel and of the common iliacs.

The objections to the usual methods are well known; even those more nearly successful ones demand that some form of temporary clamp be used, and it is impossible to prevent infection when, for a considerable time, it is necessary to retain a direct communication from the artery to the exterior of the body along the clamp.

Silver and aluminum (bands) were tried, and aluminum chosen as the more suitable; different degrees of pressure were used, and the shape and thickness of the metal modified to best provide the desired pressure. A new device is now used by which the strip of metal is evenly curled about the vessel and any desired amount of pressure made. Aside from numerous experiments on dogs, Doctor Halstead has operated on a number of persons, and his experience is that sheet aluminum No. 25 should be secured, cut into three-fourth inch strips and then rolled out to various thicknesses.

The thinnest ones are used for small vessels, and No. 33 for vessels the size of the abdominal aorta or the common carotid. The length of the band should be about that of the circumference of the artery, and widths vary from 2 mm. to 1 cm.

With some practice one learns to avoid flattening the band as it is curled about the vessel with the roller. The vessel is raised slightly from its bed with two strips of tape, and by traction on the upper tape the circulation can be so controlled as to reduce the size of the artery. The pressure curves showed a total disappearance of the dirotic elevation from the femorals in a case in which a band was placed about the thoracic aorta.

The results of this work would seem to assure us of a means whereby we can hope in the future to almost occlude a large artery and allow nature to complete the occlusion safely and with simultaneous establishing of a good collateral circulation. Its application to cases which are now treated by the "Matas" operation will

be of interest, and the relative value of the two will be of the greatest importance to surgery.

On account of technical difficulties in using the "Matas" operation in deeply seated aneurysms, the ingenious device of Doctor Halstead is doubly welcome.—*Surg. H. C. Carl.*

PATHOLOGY AND BACTERIOLOGY.

Surg. C. S. BUTLER and Passed Asst. Surg. O. J. MINK, U. S. Navy.

FLEMING, ALEXANDER, M. D. A simple method for the diagnosis of syphilis. *The Lancet*, May 29, 1909.

The author speaks of the Bordet-Gengou phenomenon and the application of it by Wassermann. The requirements for the Wassermann are so exacting that they place the test out of the realm of easy application. Levaditi and others showed that the reaction was not specific for syphilis, but that a body present not alone in syphilitic organs (as was supposed by Wassermann) but also in normal organs could take the place of antigen. These bodies, Landsteiner showed, were of the nature of lipoids, and were soluble in alcohol. Lecithin and cholestrin, known lipoids, could take the place of organ extracts in binding complement, and the fact that these substances gave no antibodies when injected into animals puts the reaction out of line with the Bordet-Gengou phenomenon. Bauer took advantage of the fact that there exists in normal human serum a hæmolytic amboceptor for sheep's corpuscles, and Hecht took advantage not only of this amboceptor but also of the patient's complement in applying the test. The author's method is a simplified Hecht technique and requires (1) alcoholic extract of heart muscle, (2) serum to be tested, (3) sheep's red corpuscles.

1. Alcoholic extract: 1 gm. of heart muscle is ground with 5 c. c. of absolute alcohol in a mortar, placed in a test tube at 60° C. for one hour and allowed to sediment for twenty-four hours at 37° C. The supernatant fluid is poured off and stored on ice. For use it should be mixed with salt solution. It should not be strong enough to interfere with the hæmolytic power of normal serum, but sufficient to completely bind the complement of syphilitic serum. This should be ascertained by experiment.

2. Serum is taken from the patient in the ordinary way.

3. Sheep's corpuscles in whipped blood can be obtained from a butcher. The corpuscles should be repeatedly washed in normal salt solution and made up in a 10 per cent suspension for use. Can be kept several days.

The test may be carried out in two ways. Graduate a capillary pipette by making two marks upon it, the lower one (when the

lumen is filled) representing one-fourth the amount of fluid as will be indicated by the higher mark. Set six test tubes (small) into a rack or sand bath in two rows, add 4 volumes (up to the higher mark on the pipette) of salt solution to each tube in the first row and the same quantity of extract to each tube in the second row. Now to the first pair add 1 volume of normal serum, to the second pair 1 volume of syphilitic serum, and to the third pair 1 volume of the patient's serum. Lastly, in one other tube place 4 volumes of extract without serum. Now place all the tubes in the incubator for one hour and then 1 volume of the sheep's corpuscles emulsion is added to each tube and all again placed in 37° C. incubator for two hours. The result may be read then or tubes placed on ice for several hours to allow better sedimentation. If the patient had syphilis, his tube containing extract will show no hæmolysis, while the one containing no extract will show hæmolysis. This condition will be duplicated in the tubes of the syphilitic control.

If the test is negative, there will be hæmolysis in all tubes except that one of the syphilitic control which contained extract. Of course, the tube containing only extract and corpuscles should show no hæmolysis.

The second method of carrying out the test is simpler, and requires only a stock of opsonic pipettes graduated as above by marking for 1 and 4 volumes, fitted with a rubber teat. In No. 1 pipette draw up 4 volumes of extract and 1 of patient's serum; leave an interval by allowing a bubble of air to enter and then draw up 1 volume of sheep's corpuscles emulsion. Seal the end and incubate for one hour; then break the tip and blow out contents into a watch glass and mix thoroughly. Draw the mixture into the pipette, incubate for two hours; at the end of which time the reaction can be read. Of course, controls should be run using normal, syphilitic, and no serum as in the first instance.

The author states that "the method I have described above has these great advantages which put it within the reach of any practitioner: (1) It requires only a very small amount of the patient's blood, such as may be drawn into an ordinary blood capsule as for an opsonic index, or Widal's test, and thus obviates the necessity of drawing off blood from a vein with a syringe, while at the same time making it easy for a blood sample to be sent to a laboratory for the test to be done. (2) It does away with the use of an animal immunized to sheep's corpuscles as in Wassermann's test or to human corpuscles as in Noguchi's modification. This process of immunizing an animal is a tedious one, and as it comes under the heading of vivisection it is in this country of very limited application. Thus the only thing one requires to get frequently is the sheep's blood,

which can be readily obtained anywhere twice a week or oftener from a butcher."

"The results obtained from this simplified technique seem to be quite as good as those obtained by the more complicated procedure of Wassermann."—(C. S. B.)

JACKSON, D. D., and MELIA, T. W. **Differential methods for detecting the typhoid bacilli in infected water and milk.** (Mount Prospect Laboratory, Brooklyn, N. Y.) *Journal of Infectious Diseases*, April 1, 1909.

The authors point out the importance of subjecting pathogenic bacteria in milk and water supplies to rapid and definite isolation. This has been difficult and uncertain up to the present by reason of the greater abundance and hardihood of other forms in these fluids. They review the various procedures from Parietti's (1890) down to the present time proposed for this purpose and describe a new procedure which is not subject to the liability of losing *B. typhosus* in case it is present in small numbers. It is based on the preliminary cultivation of the sample of water, milk, or feces in lactose bile as an enrichment medium and plating from this upon Hesse's agar to get the characteristic typhoid colonies.

Hesse's agar may be used to plate dilutions of feces directly, but the authors have gotten more definite results by preliminary culture in lactose bile. Plant dilutions of feces on Hesse's agar and at the same time inoculate with the feces a fermentation tube of lactose bile and incubate all at 37° C. If on second day the plates are unsatisfactory, a series of dilutions are made from lactose-bile tube, which may be followed by second series from two-day's-old culture.

Preliminary culture in lactose bile greatly increases number of *B. typhosus* present and preserves cultures for further transfers when second and third tests are necessary. The lactose bile is fresh ox bile (or a 11 per cent solution of fresh, dry ox gall) with 1 per cent lactose and 1 per cent of peptone. Fermentation tubes holding 40 c. c. of the sterilized liquid are inoculated with varying amounts up to 10 c. c. of the water or milk to be tested. *B. typhosus* grows more rapidly upon this medium than *B. coli*, and the two quickly outgrow other organisms. *B. typhosus* does not produce any change in this medium, while, of course, *B. coli* produces gas and acid. Hesse's agar easily distinguishes between *B. coli* and *B. typhosus*, so by combining the lactose-bile-peptone method with the special agar plating medium the authors were able to isolate *B. typhosus* from suspected milk and water. The Hesse agar contains the following:

Agar (4.5 gm. absolutely dry)	5.0 gm.
Peptone, Witte	10.0 gm.
Liebig's extract of beef	5.0 gm.
Salt	8.5 gm.
Distilled water	1,000.0 c. c.

Four and five-tenths grams *dry* agar must not be exceeded, medium must be stored in ice chest saturated with moisture, cultures must be incubated in 37° C. chamber saturated with moisture, porous tops to petrie plates an advantage. Four and five-tenths grams agar are dissolved in 500 c. c. of water by heating over flame and making up loss. To another 500 c. c. of distilled water is added 10 grams peptone and 5 grams Liebig's extract of beef and 8.5 grams salt. This is dissolved by heat and loss made up. Add two solutions together, boil for thirty minutes, make up weight by distilled water, and filter through cotton held with cotton flannel, passing filtrate through several times until clear. Adjust to plus 1 and tube 10 c. c. quantities. Sterilize for twenty minutes at 120° C. (15 pounds pressure).

Dilution plates are made as follows: Eight tubes containing 9 c. c. of distilled water or normal NaCl are set in a rack together with a series of sterilized petrie dishes, both numbered from 1 to 8. Into tube 1 place 1 gram, or 1 c. c., of feces, water, or milk to be tested, which has previously been inoculated and incubated for twenty-four hours as 37° C. After mixing thoroughly with the 9 c. c. of distilled water, place 1 c. c. of this mixture into petrie plate 1 and 1 c. c. into tube 2. Then 1 c. c. of tube 2 into plate 2 and 1 c. c. into tube 3, and so on. Then pour into each plate 10 c. c. of Hesse's agar at 40° C. and mix thoroughly and place in ice box until cool and incubate twenty-four hours at 37° C. The characteristic growth of *B. typhosus* upon Hesse's agar is produced only when but few bacteria are present. It is distinguished from *B. coli* by its formation of colonies of much larger size and often several centimeters in diameter and consisting of a broad translucent or scarcely turbid zone between the white opaque center or nucleus and the perfectly circular narrow white rim or edge. When these characteristics are observed, the colonies should be put through the usual cultural and agglutination tests for *B. typhosus*. Bacteria other than *B. typhosus* which give similar colonies may be excluded by agglutination.

CONCLUSIONS.

Bile is a natural medium for the growth of the typhoid bacillus, and it retards the growth of other bacteria except *B. coli*. When lactose is present in bile *B. coli* causes copious gas formation and soon produces sufficient acidity to retard its own growth, so that the final result is a preponderance of *B. typhosus*, which has been multiplying rapidly in the medium and is not materially affected by this acidity.

When samples of milk or water are inoculated into lactose bile and incubated at 37° C., and then transplanted into varying dilutions with Hesse's agar, very characteristic colonies are formed in the high dilutions when *B. typhosus* is present.

Any volume of water may be tested, provided at least four times as much lactose bile as water is added to bottle before incubation. In routine water analysis, when gas is formed in bile tube, cultures should be plated out on Hesse's agar to determine the presence of *B. typhosus*. If characteristic colonies are formed, they should be cultured and agglutinated for *B. typhosus*.—(C. S. B.)

ROGERS, L. **A peculiar intralobular cirrhosis of the liver produced by the protozoal parasite of Kala azar.** *Annals of Tropical Medicine and Parasitology*, Vol. II, 1908.

Chronic kala azar cases with ascites are not infrequently found due to intralobular cirrhosis of the liver. The parasite is then found in the liver. This form of cirrhosis is frequent in Bengal, and was probably formerly considered to be of malarial origin.—(O. J. M.)

BIRCH-HIRSCHFIELD, and KOSTER. **The pathological anatomy of atoxyl poisoning.** *Fortschr. d. Med.* July 26, 1908, No. 22.

Dogs and rabbits poisoned experimentally with small doses of atoxyl showed loss of appetite, emaciation, ataxia of the posterior extremities, incontinence of urine, and terminal paralysis of all four extremities. Two of the dogs were studied microscopically. The retina showed marked destruction of the ganglionic and inner nuclear cell layers. The optic nerve, the nerve fibers of the brain and of the white substance of the cord, and the anterior and posterior roots, showed a diffuse medullary sheath destruction. In the fasciculus of Lissauer was a striking destruction of fibers, and in the anterior horn cells was varied chromatolysis. In the brain, besides much fat in the Pia and Arachnoidæ was a fatty degeneration of the brain cells. The dilated peri-adventitial lymph vessel sheaths were filled with fat droplets. The liver showed fatty degeneration. The kidneys, besides fatty changes in the epithelium, showed the tubules plugged with fatty casts and hemorrhagic exudate.—(O. J. M.)

HERTER, C. A., and KENDALL, A. I. **An observation on the fate of *B. Bulgaricus* (in bacillæ) in the digestive tract of a monkey.** *Journal of Biological Chemistry*, Nos. 2 and 3, vol. 5, October, 1909.

The authors were induced to make this experiment by the work of Metchnikoff on the Prolongation of Life and by the scarcity of exact knowledge upon the subject. Herter had previously studied the results of administering living and dead cultures of *B. coli* and *B. proteus*. Live cultures increase indican and ethereal sulphates in

the urine, while dead cultures do not. Lactic-acid bacilli injected into the small intestine tended to decrease output of indican and ethereal sulphates. Metchnikoff was led to believe that lactic-acid-producing bacilli, once established in the intestinal tract, tended to prevent the growth of putrefactive organisms. Where lactic-acid bacilli are few or absent in the intestinal tract their reenforcement or reintroduction will aid the host to throw off inimical bacteria, it is supposed.

Lactic-acid bacteria should produce no substance inimical to the host, should be able to establish themselves in culture in the intestine, and should produce a sufficient amount of lactic acid. The organism selected by Metchnikoff was *B. bulgaricus*, present in the Bulgarian "Yougourt." It is a large rod with rounded ends, which holds Gram's stain, and in degenerated forms Gram's staining spots in the rods produce the appearance of Babes-Ernst granules; grows poorly on most media, and not at all on media without carbohydrates. In milk it multiplies rapidly and produces large amounts of acid—about 25 grams to the liter of dextro and lævo-rotary (chiefly dextro) lactic acid. Ten per cent of the casein is appropriated by the bacterial cells.

The results of several observers who experimented with these cultures are quoted. Cohendy found upon himself that pure cultures reduced intestinal putrefaction and could be recovered from the intestine several weeks after the ingestion was stopped. Leva, from his experiments, concludes that (1) the excretion of ethereal sulphates during the experiment was practically unchanged; (2) the excretion of volatile fatty acids with lactobacilline alone, or milk alone, as well as with lactobacilline and milk combined, showed a considerable decrease; (3) the excretion of aromatic oxyacids and hippuric acid was uninfluenced by milk, decreased distinctly in amount with lactobacilline, decreased greatly with lactobacilline and milk; (4) the phenol excretion decreased somewhat under the influence of lactobacilline alone, as well as with milk alone; there was a much greater decrease with a combination of lactobacilline plus milk; (5) the indican excretion was very slight at the beginning of the experiment (too small an amount to measure accurately) and remained practically unchanged throughout the entire period.

It would seem from the experiments hitherto carried out that animals taking cultures of lactic acid improve in condition, gain in weight, and the effect is generally beneficial. As few of the bacilli are found in the feces, the question arises, In what part of the alimentary tract do they find conditions most favorable to their growth? Do they act directly upon the inimical bacteria in the large intestine (the chief site of putrefaction), or do they act from a distance? It

was to determine this point that this experiment was undertaken. The organism used was a bacillus isolated from "Bacillac."

A Rhesus monkey was given 500 c. c. of sweet milk three times a day for three days. The feces were examined for lactic acid and for Metchnikoff bacilli. In no case was either found. The animal was afterwards fed upon milk prepared with "Bacillac" for two weeks. The quantities given were 500 c. c. three times a day. The feces were cultured for the Metchnikoff bacilli and tested chemically (using the thiophene reaction of Fletcher and Hopkins) for lactic acid. On the sixth day the bacilli appeared in the feces and on the eighth day the first positive test for lactic acid was gotten. After two weeks the monkey was killed and the alimentary contents at various levels of the tract were examined by smears, chemically, and by cultural methods.

CONCLUSIONS.

1. By feeding a Rhesus monkey for two weeks exclusively on milk fermented with *B. bulgaricus* (but containing also some yeasts) it was possible to maintain an acid reaction throughout the digestive tract. The acid reaction was more pronounced above the ileo-caecal region than at this region or below it. The acidity decreased progressively from the ileo-caecal region to the anus. Lactic acid was detectable at every point in the digestive tract that was tested, the reaction growing less marked below the ileo-caecal region.

2. Exclusive feeding for two weeks with milk fermented with *B. bulgaricus* failed to establish the predominance of this organism in the ileo-caecal region or in the large intestine. In the latter situation the number of bacilli of this type was relatively small and decreased toward the anus. Thus in the regions characterized by most active putrefaction the lactic acid bacilli failed to establish themselves in relatively large numbers.—(C. S. B.)

DUDGEON and MEEK. A contribution to the pathology of the spleen. Proceedings Royal Soc. of Med., April, 1909.

The object of this work was to determine the part played by the spleen in certain acute and chronic infective and noninfective diseases. The work included the histological and cytological changes and bacteriological findings in 46 acute infective and non-infective diseases, 26 chronic diseases, and 13 chronic cases with acute terminal infection.

The cultures in the acute cases only are of interest. The typhoid bacillus was found regularly in typhoid fever, cocci frequently, and a diphtheroid bacillus once, in septicaemia. In four cases of lobar pneumonia, two gave cultures, one the pneumococci, the other the influenza bacillus.

The chronic cases were of little interest except those with acute terminal infections in which cocci were found in a few cases. One-half the spleens showed marked enlargement due either to engorgement with blood or connective tissue increase, or both. Engorgement was most marked in typhoid, pneumonia, septicæmia, and pyæmia, toxæmic jaundice, and pernicious anæmia. The fibrosis occurred in the chronic diseases, especially hepatic cirrhosis.

The authors describe in detail the various cytological changes found in the malphigian bodies in the various diseases.—(O. J. M.)

WEBER and LEDINGHAM. A note on the histology of a case of myelomatosis with Bence-Jones protein in the urine. *Proceed. Roy. Soc. Med.*, April, 1909.

During life the patient excreted the typical protein to the extent of 12 grams per day.

At autopsy the sternum, ribs, clavicles humerus, and femur were found transformed into mere shells of very hard brittle compact bone filled with a dark red opaque jelly-like substance replacing the bone marrow. There was no evidence of metastasis of the bone marrow growth anywhere in the body outside the bones. Microscopically the fat cells are compressed by the cellular elements which present all the morphological characteristics of plasma cells. These cells show numerous nuclear changes which are considered to be of a degenerative rather than a proliferative nature.

From the histological evidence the authors offer the suggestion that the cytophosphic residue of the karyolyzed plasma cells may be the source of this peculiar protein.—(O. J. M.)

MORELLI. A new method for the recognition of indol in media. *Centralblatt für Bacteriologie*, May 21, 1909.

This depends upon the fact that (1) oxalic acid in the presence of indol gives a red color, (2) indol is volatile. Strips of paper are dipped in a hot saturated solution of oxalic acid and cooled. A strip is hung in the tube to test and the presence or absence of the red color noted.

The advantages are (1) the reaction is given with practically all the common media except gelatine, (2) the test can be made without destroying the culture.—(O. J. M.)

NERI. The rapid diagnosis of rabies. (A new strain for Negri bodies.) *Centralblatt für Bacteriologie*, May 21, 1909.

This stain depends upon the mordant action of iodine or the so-called iodine resistance.

METHOD.

1. Fix smears in absolute alcohol for ten minutes or use sections prepared by the acetone method of Henke and Zeller.

2. Stain ten minutes in—

Eosin (Grübler) -----	grm--	1.0
Iodine -----	do--	0.1
Potassium iodide -----	do--	2.2
Aqua, dest -----	c. c--	100 0

3. Wash in distilled water.

4. Five minutes Methylene Blue 1 per cent.

5. Rapid wash in distilled water.

6. Differentiation in 95 per cent alcohol.

7. Dehydrate, clear and mount.

Negri bodies are violet red with blue nucleus and nucleolus. Nerve cells blue.—(O. J. M.)

MEDICAL ZOOLOGY.

Surg. R. C. HOLCOMB, U. S. Navy.

GARRISON, PHILIP E. (assistant surgeon, U. S. Navy). **A new intestinal trematode of man.** The Philippine Journal of Science, Vol. 3, No. 5, section 13. Medical Sciences, November, 1908, p. 385.

Doctor Garrison describes a new intestinal parasite found in a native of the Luzon province of Ilocos Sur. To the date of his paper he had encountered five cases, all of them in prisoners at Bilibid prison, coming from northwestern Luzon.

Attention was first brought to the probable existence of the parasite by the presence of an ovum, about 100 microns long, oval in form, with one end more sharply rounded, shell light brown in color and of medium thickness, with an operculum at the sharper end; contents rather refractile, colorless, and composed of a mass of yolk cells, among which the germ cell could in some cases be distinguished.

The adult parasites were obtained by the use of male fern and were of a diminutive size, and characterized by the prominence of the ventral acetabulum and for the general contour of the body, which is broadest at the acetabulum and tapers posteriorly throughout fully two-thirds of its length.

The eggs of the parasite were not found to be particularly numerous, though 21 of the small trematode worms appear to have been obtained after treatment with male fern. The ovum in about ten days developed a ciliated miracidium, which, raising the operculum, escaped from the shell and swam free in the water. Attempts to infect snails and one variety of fish were unsuccessful.

Garrison proposes a new genus and species in the family Fasciolidæ, for which his specimens are the type, and proposes the name *Fascioletta ilocana*.

The following is the specific and generic diagnosis according to Garrison:

FASCIOLETTA gen. nov.

Generic diagnosis.—Fasciolidæ: Body small, elongate, broader anteriorly than posteriorly. Acetabulum near and much larger than oral sucker. Intestinal tract with short, broad prepharynx, highly developed pharynx, short œsophagus, and long, unbranched cæca, which pass along lateral margins and extend to near the caudal extremity of worm. Excretory system consists of a posterior median stem which, posterior to the testicles, divides into two laterally placed canals which extend anteriorly, separating the testicles, shell gland, ovary, and uterus from the cæca and vitellaria. Genital pores anterior to acetabulum. Male organs: Testicles massive and compact, situated one directly behind the other, in the median line, in posterior portion of body, both caudad of transverse vitelloguct.

Cirrus and cirrus pouch highly developed. Female organs: Ovary compact, unbranched, situated slightly to right of median line at about the equator of body. Receptaculum seminis absent, Laurer's canal present. Vitellaria most highly developed in posterior one-fifth where superficially they spread over the dorsal and ventral surfaces, more or less completely encircling the body. Anterior to the caudal border of the posterior testicle they are confined to the lateral fields, conforming closely to the lateral margins of the body, external to the intestinal cæca, and reach a position considerably cephalad of the ovary.

Shell gland well developed, situated between ovary and anterior testicle. Uterus coiled in the space bounded laterally by excretory channels, anteriorly by acetabulum and posteriorly by ovary and shell gland.

Ova large, operculated, not very numerous, and develop ciliated miracidium after leaving body of host.

Host of type species.—Homo sapiens.

Type species.—Fascioletta ilocana.

Habitat.—Intestine.

FASCIOLETTA ILOCANA sp. nov.

Specific diagnosis.—Fascioletta: Length, 4 to 6 millimeters; maximum breadth, 0.75 to 1.35 millimeters; maximum thickness, 0.50 to 1 millimeter; greatest breadth and thickness a little posterior to the caudal border of the acetabulum. Posteriorly, the body attenuates gradually throughout two-thirds its length to a rounded caudal extremity; anteriorly, for about one-third its length, to a rather sharper cephalic extremity. In the posterior half the body becomes increasingly flattened toward the caudal end. Oral sucker terminal or

slightly ventro-subterminal, small (130 to 200 microns transversely by 75 to 130 microns deep); dorsal lip much larger than ventral, giving the sucker a ventral inclination. Ventral acetabulum about three times as large as oral sucker (nearly globular, 480 to 518 microns in diameter), situated with its center at about the junction of the first and second anterior fifths of the body length. Skin smooth and without spines. Pigmentation slight and evenly distributed. Prepharynx from 10 to 63 microns long. Pharynx globular, from 150 to 190 microns in diameter. Oesophagus short (50 to 100 microns). Intestinal bifurcation immediately anterior of plane passed through genital pore. Intestinal cæca thin walled; follow closely to the lateral margins of body to near its posterior end, being partly inclosed by the vitellaria throughout considerably more than the posterior half of their course. Genital pores open upon the surface separately to the left of the median line and slightly posterior of a plain midway between posterior border of pharynx and anterior border of acetabulum. Male organs: The cirrus pouch is from 560 to 608 microns long by from 240 to 280 microns broad; situated antero-dorsad of the acetabulum, with its longitudinal axis directed antero-ventrally and slightly to the left. Posteriorly it contains a bladder-like vesicula seminalis, which receives the vasa deferentia and gives origin to a well-developed cirrus, which takes a more or less coiled course to the male genital pore through which it may protrude in from one to two spiral turns. Vasa deferentia divergent.

The testicles lie one immediately and directly behind the other, occupying the median field just caudad of the transverse vitello-ducts. Each testicle is more or less distinctly divided into an anterior and posterior lobe by a transverse, circular constriction, and other slight indentations of the surface may indicate ill-defined secondary lobules. Female organs: Ovary globular, situated at equator of body, slightly to right of median line. Vitellaria highly developed, extending antero-posteriorly from the caudal extremity to a plane midway between proximal borders of ovary and acetabulum. Cephalad of the posterior border of the testicles they lie along the extreme lateral margins, filling the space between margins and cæca and extending somewhat upon the dorsal and ventral surfaces, thus inclosing the cæca dorsally and ventrally between the two superficially placed vitellogen layers. Caudad of the testicles the vitellaria spread over the dorsal surface and meet in the median line, at the same time gradually encroaching upon the median field ventrally. In the extreme posterior portion of the worm (about one-tenth of its total length) they may meet in the median line ventrally as well as dorsally, thus completely inclosing the caudal extremities of the cæca and excretory tract. At the anterior border of the anterior

testicle the transverse vitello-ducts pass inward and slightly forward to the well-developed, globular shell gland which fills the space between the anterior testicle and the ovary. Uterus fairly well developed, its coils filling the median fields between the excretory tracts from the acetabulum to the ovary on the right side, and extending caudad of the ovary on the left to the border of the anterior testicle. Its anterior extremity is continued into a well-developed vagina which passes diagonally across the median line dorsad of the acetabulum to reach the female genital pore, which is situated just to the outer side of the male pore.

Ova from 88.8 to 114.7 microns long by from 53.5 to 81.9 microns broad, averaging 99.58 by 56.04 microns; develop miracidium in about ten days after leaving host. Further development unknown.

Habitat.—Intestine of man.

Type locality.—Ilocos Sur, northern Luzon, P. I.

Type specimen.—240-A (cotypes number 240), Helminthological Collection, Bureau of Science, Manila, P. I.

WELSH, D. A., CHAPMAN, H. G., STOREY, J. C. (physiological and pathological laboratories of University of Sidney). **Some applications of the precipitin reaction in the diagnosis of hydatid disease.** *Lancet* (Lond.), April 17, 1909, p. 1103.

This report is based on 50 precipitin reactions, tested in 36 patients known or suspected to harbor hydatid cysts. Two of these authors had previously reported their experience in 9 consecutive, unselected cases in which the precipitin reaction was positive in 8 of them. The single exception, however, yielded a precipitate when the patient's serum was tested with the hydatid fluid obtained from another patient. All of these 9 cases were tested under favorable circumstances—that is to say, the serum and the hydatid fluid were taken from the same patient and tested within 24 hours, or when the serum and hydatid fluid were obtained from different patients, the hydatid fluid had not often been kept for more than a few days. In this report the authors deal with their efforts to obtain a reaction with hydatid fluids not derived from the patient whose serum was being tested, and also seeking to obtain a hydatid fluid of extract capable of reaction after being preserved in a sterile condition for many months. Their results, while encouraging, revealed difficulties in the interactions both from the standpoint of the serum of hydatid patients and the hydatid fluids.

With reference to the hydatid antisera from the human subject they suggest that as the absorption of the material of the hydatid cyst extends usually over a long period of time before the patient comes under observation the capacity of the human organism for

reaction may become exhausted. Again the absorption may be inadequate and irregular both in amount and in time. With regard to the hydatid fluid they found that this fluid, filtered or unfiltered, allowed to stand in a sterile condition develops a deposit and that the deposit is associated with a deterioration on the part of the hydatid fluid in its capacity to develop an interaction with hydatid antisera. While a negative reaction between the hydatid antisera and hydatid fluid is inconclusive a positive reaction is conclusive of hydatid invasion, as a precipitate was not obtained in any interaction of the human serum and hydatid fluid where the serum was obtained from a patient not invaded by hydatid cysts.

ALLEN, JAMES F. *Bilharzia hematobia, and circumcision.* Lancet (Lond.), May 8, 1909, pp. 1317-1320.

Doctor Allen reviews his long experience with bilharzia disease in Natal and asserts his belief that the parasite gains entrance to the body by the urethra during bathing. He bases these conclusions on the fact that the miracidia are soon killed by dilute acids and that infection by the digestive tract is impossible because of the fatal action of the hydrochloric acid on the ciliated embryo. He is of the opinion that the miracidia gain entrance to the body through the urethra while bathing. The infection is more frequently found in boys before puberty who have a long prepuce, and less frequently in girls. He is of the opinion that the elongated prepuce is favorable to forming a sac, in which some water, possibly containing miracidia, may be retained, and conditions are thus furnished favorable for the ciliated embryo to make its way along the urethra to the membranous portion, where it finds lodgment.

Incidentally he traces the possible origin of circumcision among the Jews and in Egypt to a sanitary precaution which later developed into a religious rite.

MUSGRAVE, W. E., CLEGG, M. T., with a bibliography by POLK, MARY. *Trichocephaliasis.* The Philippine Journal of Science. B. Medical Sciences, Vol. III, No. 6, pp. 545-570.

These investigators believe that the parasitic *Trichuris trichiura* should be attributed more pathogenic properties than has heretofore been conceded by the majority of text-books on medicine.

They show that the majority of investigators who have published original work have attributed to these parasites pathogenic properties, and they publish four cases in their own experience in which

the parasite appeared to be the cause of symptoms manifested. As to the modes of transmission the following is quoted:

Direct.—Inasmuch as an intermediate host is not necessary for the propagation of this parasite, and inasmuch as contact with faecal discharges is necessary in order to receive the eggs into the gastro-intestinal canal, infection proves a closer personal contact with filth than is true of many other parasitic infections. However, because of the slow development of the eggs under outside influences, immediate transmission from person to person or auto-reinfection can not occur.

Water, when contaminated with faecal discharges, directly or indirectly, may become a transmitter of infection, but because of the rapidity with which the eggs are sedimented in water, it would seem as if this were a much less important medium of transmission than it is generally considered to be.

Food, particularly uncooked vegetables, and to a less extent fruits, are undoubtedly a means of transmission in a considerable number of instances. On two occasions during our study of the washing from fresh vegetables for the presence of amœbæ, ova *Trichuris* were found in the sedimented material. The danger from fresh vegetables is great in those countries where human faeces are used as fertilizer for the vegetable gardens. Although this procedure is a violation of the law, it is certainly practiced to a considerable extent by Chinese gardeners in the Philippines, as it is in several other oriental countries.

Insects, such as flies, water bugs, roaches, etc., may be factors of some importance as transmitters of the infection by mechanically carrying it from infected faeces to food and water supplies.

Soil, in localities where methods of sewage disposal are primitive, surely becomes infected and because of the great viability of the eggs in earth, such places become a menace in many obvious ways. So-called clay eaters would be especially liable to infection.

Air, clothing, dust, and other substances may be considered as possible factors in the spread of the infection in a mechanical way.

Animals.—Several authors have called attention to the possible influence of animals in the transmission of this infection. When it is remembered that some domestic animals used as pets may harbor this parasite, and that from their habits several of them are likely to have the eggs in their hair, it would seem that animals might be expected to be occasional transmitters of the infection, particularly among children.

In discussing the pathogenicity of this parasite, the largely accepted view of commensalism they find is not in accord with the majority of reported observations. This they attribute to two factors.

First, the great and general prevalence of the parasite without symptoms.

Second, the lack of a satisfactory explanation for a pathogenic action.

With reference to the first they show that other parasites, as the *Balantidium coli*, *Dibothricephalus latus*, *Strongyloides stercoralis*, and even the *Uncinaria* may exist without symptoms. They state that 90 per cent of individuals harboring the latter parasite in the Philippines show no symptoms whatever of the infection, whereas its pathogenicity is well accepted.

With reference to the second factor, several views have been advanced, first, the parasite has been considered a blood sucker; second, it is possible that the effect is produced by a hæmolytic substance, such as is also accredited to hook worms; third, the result of formation of a toxin; fourth, by mechanical action and by its producing perforations which open the way for bacteria. Taking the first of these they show that the parasite is probably not a blood sucker, and that the only support for such a view is the statement of Askanazy that he isolated "an iron containing pigment from the epithelial cells of the intestine of the parasite." In worms from one of their fatal cases no trace of pigments of blood origin could be detected in the Bureau's chemical laboratory. They point out that the loss of blood from the site of the worm's attachment would not be sufficient to alone account for the symptoms; and that no definite toxic action has been proven. They seem to be inclined to the view that it is more likely that the symptoms are caused by some peculiar hemolytic action of the parasite.

In discussing the pathology, symptoms, and treatment, after reviewing their cases and the literature, they say:

Pathology.—The general pathologic changes in fatal cases of trichocephalliasis are severe secondary anaemia. The special conditions are the presence of worms and certain changes at their points of attachment to the mucous membrane of the bowel or appendix. Several changes have been described by different authors, which in the main are hyperæmia of the mucosa with hemorrhagic points; erosions and superficial ulceration of the mucous membrane surrounded by areas of cell infiltration; and in some instances deep ulceration or other inflammatory reactions extending to the muscular coat of the bowel. Several observers have shown that the worms are attached to the mucous membrane during the life of the patient. They attach themselves by transfixing a fold of mucous membrane, by penetrating the glandular follicles, and by direct perforation, the head being embedded in the deeper layers of the bowel wall. After the death of the patient, the worms detach themselves and at autopsy are usually found free in the bowel. Several authors have demonstrated this direct attachment to the intestine. Corroborative evidence is furnished by the fact that they do not appear in the discharges even after violent purgation. The worms were not passed in a number of cases of successful treatment, when the disappearance of eggs from the feces showed that they had been destroyed. In these instances we can only assume that the parasites have been killed and remain attached to the mucous membrane of the intestine after death.

Symptoms.—We recognize, for convenience in discussion, mild and severe intestinal trichocephalliasis and trichocephalliasis of the appendix. In general the symptoms may be said to depend upon the severity and location of the infection. In mild cases of intestinal infection there are no noticeable symptoms, and the patient may harbor the parasites in considerable numbers for a long time without inconvenience. In severe infections the symptom complex is largely that of a severe secondary anaemia, with pronounced nervous symptoms and some gastro-intestinal disturbance. The early symptoms vary somewhat in different cases. Usually there is weakness, shortness of breath, nausea, vomiting, diarrhea, cramps in the muscles, nervousness, insomnia, and a gradually devel-

oping anæmia. The condition is, as a rule, progressive, with accentuation of the principal symptoms as the disease advances.

Circulatory system.—Weakness, with shortness of breath and palpitation of the heart, are often early symptoms and become more marked as the disease progresses. Evidences of anæmia, such as pallor of the mucous membrane, cedema, and hæmic murmur of the heart have been noted in several cases. As a rule the spleen is not enlarged and, in fact, it may be smaller than normal. The blood picture is largely that of secondary anæmia. There is decrease in the number of red cells, with polkilocytosis, but nucleated cells are not, as a rule, present. The number of the leucocytes remains approximately normal and the differential count usually shows a slight relative increase in mononuclears. Slight eosinophilia has been noted, but most observers agree that the eosin cells are not increased and in our cases eosinophilia was absent. No eosin cells were ever found in our case No. 1. The hæmoglobin is reduced and may be very low before death.

The symptoms in the respiratory system may consist of some dyspnoea and cough when severe anæmia is present.

The alimentary system, as a rule, suffers rather severely. Nausea and vomiting are frequent and annoying symptoms; anorexia and dyspeptic symptoms are also often encountered, although the appetite may remain good throughout the course of the disease. The mucous membranes are pale, the tongue often large and flabby, and in two of our cases it showed a dark band down the center similar to that which has been described for *uncinariasis*. There may, or may not, be tenderness and pain in the gastric region, and in the two cases where it has been recorded examination of the stomach contents showed nothing abnormal. More or less of abdominal discomfort or even pain has been a feature of the majority of the cases which have been described and diarrhea has been present in most of them. The character and number of the intestinal discharges varies, ranging from only one or two stiff, pasty stools in twenty-four hours to the severest form of diarrhea, even with bloody discharges. Again, the bowel movements may appear normal for considerable periods of time. Whatever the number and character of the bowel movements tenesmus and other symptoms, indicating involvement of the lower bowel, are rare. Stool examinations demonstrate the eggs of the *Trichuris*; at times but few, and again large numbers may be seen in a single field of the microscope. The urinary, reproductive, and locomotor systems do not, as a rule, show any characteristic symptoms. Muscular cramps, particularly in the calves of the legs, have been repeatedly observed. The urine is usually normal. The cutaneous system shows the changes due to anæmia. There may be more or less œdema of dependent parts and even anarsaca may develop. The superficial lymphatics are not enlarged.

The nervous symptoms are usually quite noticeable and consist of mental and nervous depression which may be melancholic in character; there is often great restlessness, headache, and sometimes insomnia. Objectively nothing of importance is found.

Among the symptoms of the special senses aphasia is frequent, and it is difficult to explain. Tinnitus aurium and even partial deafness have also been noted by several observers.

Appendiceal trichocephaliasis has not heretofore received much attention. Metchinkoff urged its importance and reported a convincing case in detail. Very little is given about the clinical findings, but a priori there is no reason to assume that they would be materially different from appendicitis of other etiology.

Trichocephaliasis of animals has been observed by several authors.

Analysis of symptoms.—As pointed out by Becker, the symptoms in the majority of cases of this disease fall into three groups: (1) Those of the blood, (2) nervous, and (3) gastrointestinal symptoms.

These are present to a greater or lesser extent in all cases of severe infection. The blood changes and the anæmia point positively to what we recognize as a secondary type of the latter. The absence of eosinophilia is quite generally recognized and is to be noted. French and Boycott paid particular attention to this condition and failed to find eosinophilia in 26 cases which they examined. In ours, eosinophilipænia was the rule, and in case No. 1 no eosinophile cells were found after repeated blood examinations.

The nervous symptoms are difficult to explain, particularly the mental and nervous depression and the aphasia which has been so frequently noted, and it is probable that the nausea and vomiting are to a considerable extent of nervous origin.

Even the intestinal symptoms are difficult to explain as a result of the pathologic findings; certainly they are not to be considered as being due to the direct loss of blood caused by the mechanical action of the worms. *Marsasca* and others believe that the latter secrete a special toxin, and although the entire clinical picture supports such a view, it has not been demonstrated. Bacteria and other secondary invaders entering through the injured mucosa probably account for some of the symptoms and explain those cases having septicæmia. However, the manner of the production of the symptoms remains unexplained.

Diagnosis.—While the clinical picture in some of these cases is quite suggestive, diagnosis can only be determined by finding the eggs of the parasite in the stools. Not every patient having eggs in the stools will show symptoms of the infection, and for clinical purposes only a combination of some of the clinical phenomena and the presence of eggs should be considered as a diagnosis from a practical therapeutic standpoint. The differentiation from most of the other recognized types of anæmia is readily made by the blood picture. Severe infections are only differentiated clinically from similar cases of uncinariasis by stool examinations and by the greater prevalence of eosinophilia in the hook-worm infections.

Prognosis.—Certain light infections do not appear to do recognizable harm, even when the parasites remain for a long time in the bowel. The prognosis in severe infections is grave, largely because of the difficulty with which the parasites are destroyed. Barth, Pascal, Sandler, Moosbrugger, and others have reported fatal cases. The disease may continue for a long time, and, on the other hand, as in our case No. 1, the course may be fairly acute and its duration from the development of clinical symptoms short.

Prophylaxis.—The prevention of this disease consists in personal hygiene and in public health measures. Because of the simple life cycle of the parasite and the long viability of the eggs under outside influences, personal hygiene, by avoiding the introduction of unsterilized substances into the mouth, makes protection fairly safe, even in infected zones.

The hygienic side of the problem requires a safe and practical method for the disposal of feces. This is very important not only because of the presence of whipworms, but of others as well. This subject has been covered by Garrison.

Treatment.—Whipworms are exceedingly difficult to destroy in the intestine. In this respect our experiences have been in conformity with the general literature of the subject. However, several authors have had more or less success with various anthelmintics, and in most cases where it has been possible to

destroy the worms, rapid and complete recovery of the patient has followed. Enemas of solutions of benzine have been the most successful in the hands of several observers, while others have reported success by the use of calomel, thymol, naphthol, santonin, or garlic. We have used thymol, the eucalyptus oil, chloroform, and the castor oil mixtures employed for uncinariasis, but without very much success. The benzine treatment has only just come to our notice, but to judge from the reports in the literature it deserves a more extended trial. Schiller (quoted by Sandler) used thymol by mouth and benzine solutions as enemas and secured 2,000 worms from one case. The killed worms in the experience of most authors do not pass from the bowel and their destruction is only made evident by the disappearance of the eggs from the stools. Other treatment of the disease consists in general hygienic measures, with attempts to improve the nutrition of the patient.

TROPICAL MEDICINE.

Surg. E. R. STITT, U. S. Navy.

FLETCHER, W. **Rice and Beriberi.** *Journal of Tropical Medicine and Hygiene*, May 1, 1909.

In the article Fletcher first describes some of the salient features of the disease. He notes the importance of the "jongkok" test, the name being derived from the Malay and signifying to squat down. In this test the patient places his hands on the top of his head, slowly squats down on his heels, and then rises again (the test is similar to a common exercise in physical drills). In beriberics the involvement of the extensors makes it impossible for the patient to carry out the exercise.

The method for testing foot drop seems very practical. In this the patient is seated with the leg at a right angle to the thigh. The examiner places his hand on the thigh of the patient and requests him to extend the foot and toes. If foot drop is present this will be impossible. The wrist drop test is made by placing the patient's forearm on a table at a right angle to the arm. The examiner's hand presses on the forearm and the patient is requested to extend the hand. The last joint of the thumb is usually the first to show the paresis. He notes that cases with excessive muscular hyperæsthesia are apt to be severe, although the opposite does not hold.

At the Kuolo Lumpur Asylum no cases were diagnosed as beriberi unless there was (a) absence of knee jerks, (b) the presence of the characteristic gait, and (c) inability to "jongkok."

The statistics and data as to "uncured" rice being a factor of the greatest importance in the production of the disease, as contrasted with the negative results when "cured" rice was the staple article of diet, bear out the statements of Stanton and Fraser. (This paper was reviewed in the April number of the Bulletin.)

In Fletcher's article the statistics show that of 136 patients eating "uncured" rice 24 developed the disease. During the same year, among 131 patients on a diet embracing "cured" rice, there was an entire absence of beriberi. By putting 30 patients suffering from beriberi on cured rice only 3 died (10 per cent), while of 36 beriberics continued on the "uncured" rice diet 24 died (66 per cent).

NOTE.—In a discussion of the rice factor in beriberi at the meeting of the Society on Tropical Medicine and Hygiene, May 21, 1909, Doctor Daniels referred to the use of rice flour in the preparation of bread and biscuits used for sailors. He also said that inasmuch as "uncured" rice was a widely used article of diet all over the world the matter was one of great importance.

Doctor Beddoes called attention to the malignant form of beriberi found on the Amazon River, in Brazil, where rice was not an article of diet. On the whole, as remarked by Sir Patrick Manson, it was evident that the weight of opinion of those taking part in the discussion was against the rice theory in the origin of beriberi.

CLELAND and HICKINBOTHAM. **On the etiology of ulcerative granuloma of the pudenda.** The Journal of Tropical Medicine and Hygiene, May 15, 1909.

In the clinical description Hickinbotham states that the disease is a chronic one lasting in some cases for years and tending to recur. In the male small cauliflower growths first appear about the glans penis. In the female they occur on any part of the vulva. Ulceration and cicatrization go on side by side. He notes that the patients go about apparently well with these foul, ulcerating lesions. He has had good results from cutting off the warty excrescences with scissors and then cauterizing with pure carbolic acid.

In men circumcision is always necessary.

He notes that in white men the disease is usually mild.

Cleland, in studying the pathology, states that he found nothing of the character of an epithelioma. The tissue was a network of connective tissue with plasma cells, these cells being very numerous about the vessel walls. He noted the finding of numerous spirochetes, which however were thicker, had fewer coils and were not corkscrew like.

NOTE.—It will be remembered that Wise (in the British Medical Journal about three years ago) described spiral organisms resembling closely the *Treponema pallidum* in material from granuloma pudendi in British Guiana.

SAUNBY, R., and MILLER, J. **Amœbic dysentery with abscess of the liver in a patient who had never been out of England.** British Medical Journal, March 27, 1909.

The authors report a case of ulcerative colitis with ulcers having overhanging edges containing amœbæ.

There was also present an enormous abscess of the posterior part of the liver which failed to show any bacteria on culturing. Amœbæ were found also in the material from the abscess.

NOTE.—A case of like interest was noted at autopsy at the Massachusetts General Hospital in a woman who had always lived in Nova Scotia. In this case the necrotic material at the base of the ulcers of the large intestine contained numerous amœbæ.

GENERAL MEDICINE.

Surg. T. W. RICHARDS, U. S. Navy.

JANEWAY, THEODORE C. **The dietetic treatment of diabetes.** American Journal of Medical Science, March, 1909.

Emphasizing the prime importance of dietetic treatment, the author considers that the principles enunciated by German investigators are not duly appreciated in this country as their dietaries are unsuited to our habits and tastes, defects which lead him to suggest certain modifications. Diabetic coma and difficult problems which may arise in cases complicated by other diseases are not discussed in this paper, the author confining himself to the broad outlines and essential details of practical dietetics.

Following Von Noorden, cases are clinically divided into three classes, viz: "Mild," with a tolerance of 2 ounces or more of white bread daily; "moderately severe," with a tolerance below this point but becoming sugar free on a diet without carbohydrates; and "severe" cases, which require restriction of protein also to rid the urine of sugar. The most severe types, however, show glycosuria on a restricted protein diet, or constant marked acidosis in addition to severe glycosuria. In addition to the routine clinical examination of the patient we should in every case determine: (*a*) The degree of impairment of carbohydrate metabolism, or its index, the severity of the glycosuria; and (*b*) the presence or degree of secondary disturbance of the metabolism—that is, the severity of the acidosis.

I. ESTIMATION OF THE CARBOHYDRATE TOLERANCE.

The patient is placed upon an accurate test diet of ample fuel value, but made up practically wholly of protein and **fat**. Such a standard, suited to American habits, is shown in Table I.

If, when first seen, there is considerable glycosuria and the patient has been on a liberal diet, the addition at first of 3 ounces of white bread is advisable; otherwise extreme acidosis and coma may follow. In milder cases the strict fat-protein diet may be ordered at once. In either case the bread is reduced until the urine becomes sugar free, or until the patient has been for at least a week on the strict test diet without losing his glycosuria. For the former (milder)

cases bread in weighed amounts is then added at each meal until sugar reappears; the patient's tolerance being expressed as equivalent to so many ounces of white bread, which contains, on an average, about 50 per cent of starch.

For the severe cases a reduction of protein must next be made, a suitable test diet being given in Table II.

II. DETERMINATION OF THE DEGREE OF ACIDOSIS.

The appearance in the urine of diacetic acid, acetone and beta-oxybutyric acid—the mother substance of both—results from an abnormal metabolism of the fatty acids, and occurs when too little carbohydrate is being oxidized within the organism, a permanent condition prevailing in severe diabetes. Patients tolerating 3 ounces or more of bread do not show acidosis; below this point acetone bodies may or may not occur, but should be tested for as regularly as the urine is examined for sugar. For acetone, Legal's test is recommended; for diacetic acid, the ferric chlorid test of Gerhardt, controlled by Arnold's. The tests for beta-oxybutyric acid are too complicated for general use.

Treatment.—Our aim must be the maintenance of nutrition in such a manner as to prevent or minimize, first, hyperglycemia, and, second, acidosis.

I. THE MAINTENANCE OF NUTRITION.

The 1,500 to 2,000 calories provided daily in the normal adult by carbohydrates are lost in this form to the diabetic, and must be supplied chiefly by fat, since the caloric value of protein is relatively low and more than a moderate increase is generally inadvisable. The necessary amount may be readily provided, as shown in the two test diets herewith, but fat food is disagreeable to many persons and in some cases causes digestive disturbances and diarrhea. Alcohol, not exceeding 40 grams per day, taken with meals in the form of spirits or wine, is of great value as an aid to fat digestion, without which it is next to impossible to give the large amounts of fat required in diabetes.

II. THE CONTROL OF HYPERGLYCEMIA.

In every case we should endeavor to bring about the complete disappearance of glycosuria, not contenting ourselves with reduction of sugar to a small percentage. While this may not always be possible, the chief obstacles are psychical, not physical, and in no chronic disease is cordial cooperation between patient and physician more essential than in diabetes. With the permanent interdiction of sugar and sweets in every form, patients must be taught to watch for unsuspected sources of starch, such as sauces, gravies, and soups thickened with flour. Excessive water drinking is unwise.

Following an initial period of strict diet it is advisable, in milder cases, to limit the consumption of starchy foods to not more than three-fourths of the tolerated amount, with occasional periods of strict diet, and yearly or half-yearly determinations of the tolerance anew. It is well to permit such patients to choose the form in which they will take their allotted portion of carbohydrate, guarding against possible idiosyncrasy to certain kinds of starch.

In moderately severe cases the interposition of one or two days of very low diet is of great value. Von Noorden calls these "green days," a suitable diet being illustrated in Table III.

In the severest cases where the prevention of glycosuria is manifestly impossible much may still be done to prolong life by well-conceived dietetic treatment, but the management of these cases does not lend itself to any brief presentation.

III. THE PREVENTION OF ACIDOSIS.

Acidosis, which occurs during carbohydrate starvation in the normal individual, assumes much more serious proportions in the diabetic. The milder grades diminish spontaneously after the first few days of strict diet and need occasion no alarm, but when constantly present one must proceed cautiously with prolonged periods of strict diet and must especially avoid sudden changes in the carbohydrate content of the food. Considerable amounts of alkali, one-half to one ounce of sodium bicarbonate, must be given daily in these cases. A portion of this may be replaced by sodium citrate if desired.

Shall we in any given case abandon the attempt to minimize the glycosuria because of an existing acidosis? This is the difficult question which arises in all severe cases, but the author's experience indicates very strongly that the attempt to overcome acidosis by allowing much carbohydrate almost always fails of its purpose, since this carbohydrate does not enter into the metabolism of the organism, merely adding hyperglycemia, with resultant polyuria and thirst, to the trouble already existing. In such cases permanent restriction of protein is of the greatest value and occasional "green" days are essential.

After a rather sweeping condemnation of gluten breads, which are conspicuously absent from his dietaries, the writer concludes with a strong plea for earlier diagnosis, which will bring cases under treatment before reaching the severe and intractable forms of the disease.

TABLE I.—*Standard strict diet.*

Breakfast :

- Coffee with 1½ ounces cream.
- 2 eggs cooked with one-half ounce butter.
- 3 ounces ham.

Luncheon:

Bouillon with 1 raw egg.
 3 ounces sirloin steak, chicken, or leg of lamb.
 1 ounce bacon.
 Vegetable from list, 2 tablespoonfuls, with one-half ounce butter.
 Dessert made with 1 egg and 1½ ounces cream.
 6 ounces wine, or 1 ounce whisky or brandy.

Afternoon tea with one-half ounce cream.

Dinner:

Any clear soup.
 3 ounces fish (salmon, shad, or mackerel), with one-half ounce butter.
 One-fourth pound roast pork, beef, mutton, turkey, or lamb chops.
 Vegetables from list, 2 tablespoonfuls, with one-half ounce butter.
 Salad with one-half ounce oil in dressing.
 1 ounce cheese, English, pineapple, Swiss, or full cream.
 6 ounces wine, or 1 ounce whisky or brandy.
 Demitasse of coffee.

Protein	= 126 grams; 515 calories
Fat	= 222 grams; 2065 calories
Carbohydrate	= 15 grams; 60 calories
Alcohol	= 30 grams; 210 calories

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VEGETABLES ALLOWED.

Asparagus, beet greens, Brussels sprouts, cabbage, cauliflower, celery, chicory, cresses, cucumbers, egg plant, endive, lettuce, mushrooms, radishes, rhubarb, salsify, spinach, string beans, tomatoes, vegetable marrow.

TABLE II.—*Standard diet with restricted protein.*

Breakfast:

Coffee with 1½ ounces cream.
 2 eggs with one-half ounce butter.
 1 ounce bacon.

Luncheon:

2 eggs.
 1 ounce bacon.
 2 ounces lamb chops (1), ham (2), beefsteak (3), chicken (4), or fish (5) broiled with one-half ounce butter. (Each day select meat with same number for luncheon and dinner.)
 Vegetable from list, 2 tablespoonfuls, with one-half ounce butter.
 Dessert made with 1 egg and 1½ ounces cream.
 6 ounces wine or 1 ounce whisky or brandy.

Afternoon tea with one-half ounce cream.

Dinner:

Any clear soup.
 One-fourth pound roast pork (5), beef (4), mutton (3), turkey (2), chicken (1), or lamb (1). (Each day select meat with same number for luncheon and dinner.)
 Vegetables from list, 2 tablespoonfuls, with one-half ounce butter.
 Salad with one-half ounce oil in dressing.
 1 ounce cream cheese.
 6 ounces wine or 1 ounce whisky or brandy.
 Demitasse of coffee.

Protein	= 82 grams; 334 calories
Fat.....	= 215 grams; 2008 calories
Carbohydrate.....	= 15 grams; 60 calories
Alcohol	= 30 grams; 210 calories

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TABLE III.—*Green days.***Breakfast :**

- 1 egg, boiled or poached.
- Cup of black coffee.

Dinner :

- Spinach with hard-boiled egg.
- One-half ounce bacon.
- Salad, with one-half ounce oil.
- 6 ounces of wine or 1 ounce of whisky or brandy.

4.30 p. m. :

- Cup of beef tea or chicken broth.

Supper :

- 1 egg, scrambled, with tomato and a little butter.
- One-half ounce bacon.
- Cabbage, sauerkraut, string beans, or asparagus.
- Cup of tea.

One-half ounce of sodium bicarbonate in the twenty-four hours.

BEAL, FREDERICK E., M. D. **Artificial hyperemia in the treatment of pulmonary tuberculosis, with especial reference to the Kuhn mask.** New York State Journal of Medicine, vol. 9, No. 1, January, 1909.

Following Bier's treatment of joint tuberculosis, Dr. Ernest Kuhn of the Charity Hospital, Berlin, endeavors to apply the same principles in pulmonary cases. His "mask" is designed to hinder inspiration and so bring the accessory muscles of respiration into play, with a view to producing an active hyperæmia of the apices of the lungs. The apparatus fits closely over the mouth and nose, the hindrance to inspiration being graduated by a slide placed on the nasal channels; expiration is not impeded. The patient lies on his back with clothing loosened, and at first wears the mask ten minutes only, morning and afternoon. These periods are gradually prolonged to four hours each, the obstruction to inspiration being also proportionally increased.

Some 400 of Kuhn's cases at the Charity Hospital were under Doctor Beal's daily observation for several weeks, and he states unqualifiedly that "there was an amelioration in the symptoms of each, even the most advanced cases." These patients received the regular hospital diet, and no other treatment whatever. He was particularly struck with the fact that patients brought to the hospital "in active hemorrhage" used the mask with impunity. From skiagraphs taken of these cases it appears, however, that while the use of the mask increases muscular effort during inspiration the actual excursion of the lung is lessened, and there is no violent and harmful expansion.

While the writer is evidently optimistic regarding this new method of treatment, he states that Kuhn himself claims nothing as yet, except the actual facts shown, as it is too early for final conclusions.

SPRIGGS, EDMUND I. (M. D., F. R. C. P.) **Remarks on the treatment of gastric ulcer by immediate feeding.** The British Medical Journal, April 3, 1909.

In a careful review the writer presents the results of several years' experience with Professor Lenhartz's method of treatment, the essential features of which are as follows:

(1) Complete rest in bed for four weeks; (2) feeding the patient from the beginning of the attack with small quantities of beaten-up egg and milk, the quantities being increased daily; (3) the application of an ice bag to the epigastrium; (4) adding to the dietary boiled rice, mince, and other semisolid and solid foods after the first week; (5) the administration of bismuth and iron in suitable form.

While admitting that acid gastric juice acts prejudicially upon the ulcerated surface, it is contended that this can not be avoided even by the use of enemata, as hunger and the mere thoughts of food promote this secretion. Treatment by saline injections and nutrient enemata is followed by wasting, and stress is laid upon the maintenance of nutrition as an aid to the local reparatory process. Lenhartz holds that if protein food is given often and in small quantities there is less likelihood of the dislodgment of a clot—with consequent hemorrhage—than there is of its being dissolved by the gastric juices in an empty stomach. Distension of the stomach, however, is to be particularly avoided.

After an analysis of two series of cases treated respectively by the Lenhartz and various other methods, the writer sums up his conclusions as follows:

First, that the Lenhartz method of treatment is not more dangerous than treatment by nutrient and saline enemata followed by a graduated milk diet. In these particular cases the recurrence of hemorrhage was less frequent, and there were no deaths.

Secondly, that the pain suffered by the patient in the course of treatment is less on the Lenhartz diet.

Thirdly, the diet gives more nourishment than can be introduced into the body by nutrient enemata, and is therefore more desirable in patients who have frequently been for a long time in a state of semistarvation, or have suffered a loss of blood, or both.

Fourthly, that in cases treated by this method rectal injections may be entirely avoided. This is an advantage in a hospital, and a still greater advantage in treating cases at their homes, where rectal injections are not only regarded as extremely unpleasant, but are seldom efficiently administered.

As to the ultimate results it would seem that they are quite as good after immediately feeding as those afforded by other methods, while the treatment itself is more easily carried out and less objectionable to the patient.

ELSNER, H. L. **Present status of the tuberculin tests.** New York State Journal of Medicine, April, 1909.

Alluding to the interest taken in the study of local and constitutional tuberculin reactions, the writer states that over 1,000 references to this subject have been added to our medical literature in the past fourteen months.

The three tests which are to-day claiming the attention of the profession are (1) the Pirquet, or cutaneous, test, (2) the test of Moro, which includes the local application of a 50 per cent tuberculin ointment, and finally, the simplest of all, the conjunctival or ophthalmic, also known as the Calmette and Wolff-Eisner test.

In the majority of cases these reactions are convincing and demonstrable before the appearance of tubercle bacilli, and this is what is most needed. The Pirquet test is particularly valuable in recognizing tuberculosis in children and in the recognition of latent and inactive tuberculosis. The conjunctival test, which includes the instillation of a diluted tuberculin solution—usually 1 per cent—into the eye, is most valuable in detecting incipient and active tuberculosis.

Weight of authority is in favor of the conclusion that incipient and favorable cases react promptly to the ophthalmic test. Unfavorable and acute cases are unlikely to react to local tuberculin tests. Advanced cases with cavity formation react feebly or not at all. There is no relation between the intensity of the reaction and the gravity of the lesions, as shown by feeble reaction in advanced cases with cavity formation, while initial lesions localized in a single organ may give a violent reaction. The strongest reactions may be found in cases where tuberculosis was hardly suspected.

Tuberculin tests offer very little aid in the differentiation of military tuberculosis and typhoid, as the reaction to tuberculin is likely to be negative in the former disease.

The majority of hospital and advanced cases of tuberculosis have failed to react to the Calmette test. In over three hundred tests made by the writer the following conclusions were justified: Positive reactions in 85 per cent of incipient cases, and in from 60 to 65 per cent of the patients in the second stage of pulmonary tuberculosis; in the terminal stage only 16 per cent gave positive reactions.

With advanced cases of tuberculosis, tuberculin reactions are weakened because the body is incapable of continuing the battle; protective substances, whatever these are, have been exhausted.

There was no reaction in over 80 per cent of the tuberculous meningitides.

Failure to respond to the Calmette test in subjects with positive symptoms of tuberculosis offers an unfavorable prognosis, and we should not exclude tuberculosis because of negative results with per-

sisting symptoms. This is particularly true of febrile cases, but in these the prognosis is bad.

It is probable that the cutaneous and ophthalmic tests will be found sufficient and that these will practically displace the use of tuberculin hypodermatically for diagnostic purposes. They are easily and promptly applied and can be used where tuberculin hypodermatically is unsafe, particularly with febrile conditions.

The Calmette test must be used with caution and the causes which lead to unfavorable and persisting reactions are not to be ignored.

HYGIENE AND SANITATION.

Medical Inspector H. G. Beyer, U. S. Navy.

TITI, Doctor. (Medecin de 1re cl. de la Marine.) **On a new and practical method of securing bodily cleanliness for our men on board ship.** Études d'Hygiène Navale. Arch. de Médecine Navale, March, 1909, No. 3.

When it is considered what it means for a ship in commission on which every man is given an opportunity to begin his day's work with a clean body and a conscious feeling that he is in that blissful state, we can not fail to realize the importance of any contribution to this subject, intended to help us to bring it about. We are inclined to regard Doctor Titi's work in this direction as extremely valuable.

We all know that the chief difficulties against which we have to provide are that the quantity of water allowable per man must always be limited. The number of water tanks for storing water will always have to be small. Distilled water will always involve great expense. The number of showers, basins, and washstands can not be allowed to be excessive. The process of bathing must be such as to prevent any possible transmission of contagion from man to man. Hence it follows that (1) the quantity of water available per person will always be small, and (2) that strict measures must be taken that the water used by one person has no chance of being used, in whole or in part, by another person. For these reasons, any method claiming to be of value for use on board ship must imply (1) economy in the amount of water used, and (2) it must insure the nontransmissibility of contagion from one person to another. It is just with regard to these two points that the method worked out by Titi seems of value.

Preliminary experiments made on the "Masséna."—A tank, filled with water and provided with a spigot near the bottom, was fixed at a definite height above the deck in one of the lower passages of the ship, at a place a little out of the way. Its spigot was connected with a flexible rubber tube, held in suspension in a horizontal position by cords in midline of the passage and about 5 feet above the

deck. This rubber tube, with one extremity attached to the spigot of the water tank, its free extremity closed by a stopper, has 12 small openings, each about 2 mm. in diameter, punched out of it on two horizontal lines, at opposite sides, each hole being separated from its neighbor by a distance of 3 feet. When the tank was filled with water and the spigot opened, 12 small streams of water could be seen issuing from the openings; that is, 6 on each side of the midline of the passage.

After several experiments, the following calculations were arrived at: It was found that 144 liters of water required twenty-four minutes to pass through the 12 openings in the tube. The ablutions of the bodies of two men assigned to one of these small streams could be effected within eight minutes. In other words, the 144 liters of water contained in the tank were made to suffice for bathing purposes of 72 men (three changes in twenty-four minutes), each man disposing of 2 liters of water and of eight minutes of time for the work. The assignment of two men to one stream at the same time is intended to prevent loss of water; while one of the men receives the stream on the part of the body he intends to scrub next, the other is engaged in scrubbing himself, and vice versa.

Titi says that the ship is unknown on board which the average allowance of water delivered to a man every morning, either in a basin or shower, or in a half tub is less than that utilized by this simple and effectual method. Under the most economical provision it is at least double the quantity that is expended by these various processes.

In order to enable every man to complete the thorough scrubbing of his entire body, he is supposed to arrive on the spot nude and with soap in hand. He is directed to see to it that the little stream of water falls on that portion of the body to be cleaned. The order followed is that each man begins by washing his hands, then his head, next his back and lower portion of his trunk, then his feet, and lastly his hands once again.

After these preliminary experiments had proved so satisfactory, more durable arrangements were perfected, the soft rubber pipes being substituted by perforated metallic tubes connected by flexible rubber joints with water reservoirs put up in convenient places. The pipes are in part portable and in part fixed. The portable pipes may be stored when not in use and, since they occupy but little room, no difficulty is experienced in doing this.

Among other things, Titi recommends that the forty-five minutes of the early morning set aside for the first breakfast be utilized as follows: Thirty minutes to be employed in body cleaning (the first operation) and the remaining fifteen minutes in taking the first breakfast.

The partial scrubbing is assured by this method, as well as the washing of dishes. The partial scrubbing, whether it is of the hands before meals, as is required by regulations, or of the feet after certain kinds of work, is made possible only under the provision of a separate locality for the installation of these distribution pipes. It has been found that 300 c. c. of water are sufficient for washing a man's hands and the time required to do this is one minute. Consequently the three daily washings of hands before meals would require an additional liter of water per man and per day. This would mean that 3 liters per day and per man would have to be allowed for bodily cleanliness.

The washing of dishes.—With the old method of washing dishes, the mess attendants had to carry the hot water in a basin several times across the deck and all the plates had to be washed in the same water, a very insanitary process and not giving satisfactory results. With the new method, the hot salt water, after running over the plates, runs off into the scuppers; shelves are provided for the clean plates, so arranged that the superfluous water drains off into a gutter and the plates are dried without the use of dishcloths. The time required for cleaning the plates of one table need not occupy more than five minutes.

The author then describes in detail the arrangements required to be made for the installation of a more permanent plant on cruisers and battle ships under construction and on vessels already in the service. The material needed, consisting, for the most part, of a few perforated rails with the necessary supports, is surprisingly little and easily stowed or installed in small space.

The new process is based upon the principle of doing away with basins, half tubs, and sweet water showers, substituting in their stead a series of perforated pipes, giving small jets of water. The quantity of water used is small and every drop of it is utilized. A reasonable degree of bodily cleanliness is secured and there is no chance for the spread of infection.

Finally, the author applies the same system to the distribution of drinking water to the men, and thus eliminates the scuttle-butt and the common drinking cup at the same time.—(H. G. B.)

HOFFMANN, W. (Prof. Dr. Stabsarzt.) On the heat-conducting power of linoleum as compared to that of floors made of wood or of betone (Estrich). Archiv f. Hygiene. vol. 68. Heft 1. 1908. p. 54.

It is certainly of practical interest to know exactly whether linoleum is a bad conductor of heat (v. Esmarch) or whether it is a good one (Messbaum). Linoleum consists of a mixture of oxydized linseed oil (Linoxyn) and powdered cork, to which are added certain

proportionate quantities of resin and coloring matters; this mixture is transferred upon a tissue of jute under a pressure of about 300 atmospheres. The exact proportions between linoleum and cork is still considered a secret by manufacturers.

Through an ingenious method and by a serial arrangement of thermo-elements over different places of linoleum plates and a proper recording apparatus, consisting of a registering galvanometer, the author was able to get valuable results.

A.—SAMPLES OF LINOLEUM.

Factory mark.	Thickness in mm.					
	10.	7.	4.	3.6.	3.	2.2.
A	3.03	3.38	3.88	.....	4.77	4.94
B .....	.....	3.18	3.97	4.21	.....	5.04
C	2.43	3.75	4.30	4.45	4.96	.....
D	3.03	3.74	4.30	.....	5.38	5.63
C, cork linoleum.....	.....	2.93	.....	.....	.....	.....

B.—SAMPLES OF WOOD FLOORING.

Pine	1.54	Has a thickness of 2.8 cm.
Parquette.....	1.45	Has a thickness of 3.5 cm.

C.—SAMPLES OF BETONE (ESTRICH).

Gyps-estrich	2.87	Has a thickness of 3.5 cm.
Cement estrich	3.19	Has a thickness of 1.6 cm.

D.—WOODEN FLOORING AND BETONE (ESTRICH) WITH LINOLEUM.

Pine with "A," 4 mm.....	1.41	{ Pine wood 1.54 "A," 4 mm 3.88	} Individual values of heat-conducting power.
Parquette with "C," 4 mm	1.42	{ Parquette 1.45 "C," 4 mm 4.30	
Gypsum-estrich, with "D," 4 mm	2.24	{ Gypsum 2.87 "D," 4 mm 1.30	

E.—SAMPLE OF WOOD WITH HYLOLITH.

Wood with hylolith	1.85	Thickness..... 2.5	{ Wood..... 1.0 Hylolith..... 1.5
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The values shown in the above table are average values; the lower the numbers, the less is the heat-conducting power in the different samples of flooring.

Sample C of those with a thickness of 10 mm., with a quotient of 2.43, shows the least heat-conducting power, and that is perhaps the reason why this quality has been made especially for use on warships.

The worst heat-conducting linoleum is cork linoleum, but when compared with pine wood and parquette flooring even cork linoleum is a good heat conductor. A well-constructed floor of dry wood of customary thickness best assures a warm floor, and this effect is only slightly increased by an addition of cork linoleum.—(H. G. B.)

HOME, W. E. (fleet surgeon, R. N.). *On the discrimination of unrecognized diseases and on a disease of overcrowding in ships, especially at Malta.* Proceedings of Royal Society of Medicine, April, 1909, Vol. II, No. 6, p. 159.

This paper affords a delightful and yet impressive sermon upon the importance of determining a definite diagnosis in cases in which the use of the thermometer gives only one of the important symptoms. Following references to the classic essays of Pringle, Lind, and Blane, of the eighteenth century, which first attracted wide attention to the needlessness of great morbidity upon war ships, and interesting reminiscences of his own experience with fever on ships of the Mediterranean and East African stations he shows that the separate identity of similar fevers has been established by the recognition of the dissimilar symptoms and conditions under which they occur, and that the effort should not be to make a series of fever cases conform to the accepted text-book description of what the disease may be but rather to work out its own identity.

By way of a famous illustration he notes that a contributing reason that typhoid was separated from typhus seventy years ago was that the schools of Paris happened to be contending with the natural history and treatment of the former disease while those of Edinburgh were basing their arguments upon observations of typhoid; that, neither side giving in, the identity of each was finally worked out. Malta fever prophylaxis should have been worked out and accomplished years ago, following upon Bruce's discovery of its etiology, if the conditions under which it developed on ships at Malta (in officers' messes and among those on sick-bay diet furnished with milk) had been reasoned upon and deductions made. Home believes that there are still important fevers unaccepted as yet and asserts that much of the fever of ships at Malta has been one of "overcrowding of ships."

An asthenic pyrexia without special features: After ten days' malaise and headache the patient would get nausea, retching, and vomiting, temperature 101° F. or 102° F., pulse about 100; skin moist; bowels confined; headache; pain in loins, and sometimes even already marked exhaustion. Stage of advance: Temperature 103° F. to 105° F.; skin dry, often pungently hot; eyes suffused, headache, restlessness, perhaps delirium; tongue dry, thirst, anorexia, perhaps much vomiting; bowels confined; pulse and respiration fast, symptoms worse at night. We thought this proved the fever to be, as we called it, remittent. I nowadays often wonder if it was due to the diminished ventilation, due to the stillness, the airlessness of a tropical night. Convalescence: Great debility, skin clammy; appetite slowly returned. Complication: Hæmaturia reported by one medical officer. I have known it followed by insanity; definite and routine sequelæ there were none; duration ten days, and relapses may occur. Treatment: Quinine is a good tonic, but no specific.

The true Malta fever cases (differentiated by their joint symptoms) would cease to appear upon leaving Malta, but the others continued if the weather was unfavorable and ventilation poor, and together with many pulmonary affections seemed to him to depend

upon overcrowding, humidity, a berth deck temperature of 81° , and proximity of the ship to high fortifications some or all of which at Malta and occasionally at other ports or at sea determined the appearance of this hitherto undifferentiated type of "Malta fever." "When air is breathed it is heated, it is also made moister, and by each of these changes its specific gravity is lowered—that is, the expired air is lightened and these changes make it rise away from us. But it also has its lighter oxygen replaced by heavier carbonic acid, which tends to make it denser. The ultimate specific gravity of the expired air is the resultant of all these changes and varies at different temperatures." In this connection he calls attention to a recent most valuable book by Doctor Shaw, director of the meteorological office, "Air Currents and the Laws of Ventilation," in which 81° F. is calculated "as the temperature about which these processes balance one another, so that the difference between the specific gravity of inspired and expired air vanishes. As he says: 'At such a temperature a crowd would inevitably be poisoned by its own breath.'" On account of modern improvements in naval construction, Fleet Surgeon Home states this diseases is fast becoming infrequent, but if we "accept phthisis as a measure of the degree of overcrowding," this subject must be of timely interest to all naval sanitarians and certain of the observations may be made to throw light upon the prevalence of obscure fevers and diseases of the respiratory tract which occur in ships under repair in navy-yards during unfavorable weather and when ventilation apparatus may for other obvious reasons be insufficient.—*Surg. C. N. Fiske.*

REPORTS AND LETTERS.

GUAM: REPORTS ON HEALTH AND SANITATION FOR THE YEARS 1907 AND 1908.

As the island of Guam is solely a naval station, the administration of affairs relating to health, hygiene, and sanitation has been entirely in the hands of the medical officers of the navy, and their reports constituting the only contribution to our knowledge of the health conditions of that place are therefore of unusual interest and importance. These reports show the work which has been done in the study of tropical diseases, particularly gangosa and leprosy, and the progress that has been made in the treatment of these diseases. By some oversight, the report for 1907 was not published, and it is therefore printed here in conjunction with that for 1908.

REPORT FOR THE YEAR 1907, BY SURG. F. E. M'CULLOUGH, U. S. NAVY.

* * * The trade winds blowing over Guam's limited area of less than 200 square miles, finding no barrier of high mountains to retard their force, saves it from the disagreeable and enervating climate prevailing in larger islands and continents in similar tropical latitudes. During Spanish occupation the island was used as a recuperative station for those who had become incapacitated by reason of long residence in the Philippines. The daily land and sea breezes, with the intervening period of absolute calm, peculiar to the continental shores, are almost absent. From November to June trade winds from the northeast to east usually blow steadily. During July and August they subside gradually, veering to the southeast, and by September the southwest monsoon is established. There is but 4° F. difference between the annual maximum and minimum temperature, the average being 80° F. The most uncomfortable months are July, August, and September, the discomfort not being the result of high temperature, but the absence of the trades and the excessive relative humidity. The town of Agaña, the seat of government, is unfavorably situated, from a climatic standpoint, as it is shut in and frequently cut off from the prevailing winds, and is also practically without elevation.

With more than 70 per cent of the island's entire population dwelling within the confines of Agaña, an area of less than 2 square

miles, it is not to be wondered at that the sanitary condition of a primitive people, the majority of whom have but an insignificant knowledge of hygiene, should be far from ideal. A view of Agaña, however, to one who has not visited the island since the beginning of the American occupation, gives the impression that a modern Herculean cleaning of an Augean stable has been accomplished. The daily cleaning of the streets and removal of household garbage, the banishment of great numbers of swine from the streets and underneath the houses to the ranches, and the enforcement of numerous sanitary orders has produced a remarkably clean municipality.

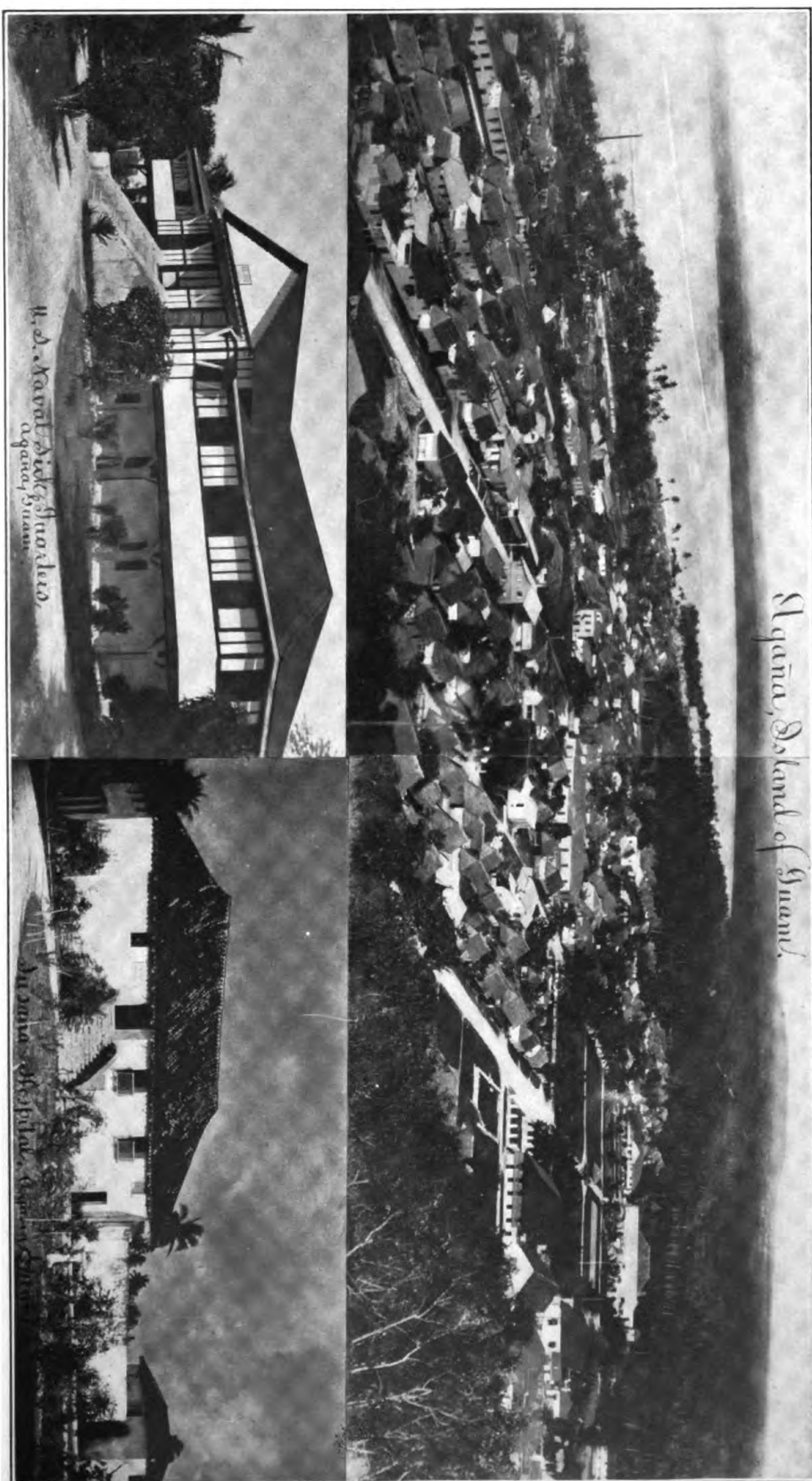
VITAL STATISTICS.

Population of Guam.....	11,361
Natives.....	10,998
Foreign (including naval forces).....	363
Increase in population since 1900.....per cent..	32.08
Births.....	532
Male.....	274
Female.....	258
Percentage of illegitimate births.....per cent..	13.74
Deaths, native population.....	277
Deaths, foreigners.....	1
Death rate per 1,000.....	24.03

The causes of death have been as follows:

Tuberculosis.....	29	Epilepsy.....	1
Guha.....	59	Meningitis.....	2
Pneumonia.....	6	Erysipelas.....	1
Chronic bronchitis.....	5	Malnutrition.....	3
Pulmonary oedema.....	1	Senile debility.....	2
Pleurisy.....	1	Leprosy.....	2
Oedema of glottis.....	1	Gangosa.....	4
Helminthiasis.....	36	Tetanus.....	5
Gastro enteritis.....	9	Premature birth.....	2
Abscess of liver.....	2	Patent foramen ovale.....	1
Congestion of liver.....	1	Stillborn.....	9
Dysentery.....	8	Iuandition.....	3
Peritonitis.....	2	Aneurysm of thoracic aorta.....	1
Appendicitis.....	1	Valvular disease of heart.....	1
Intussusception.....	1	Septicæmia.....	12
Intestinal hemorrhage.....	3	Epithelioma.....	1
Cancer of stomach.....	1	Burns.....	1
Abdominal aneurism.....	2	Gunshot wound.....	1
Cholecystitis.....	1	Surgical shock.....	2
Acute nephritis.....	3	Decapitation.....	1
Cerebral hemorrhage.....	8	Unascertainable.....	43

The death rate of 24.3 is nearly a third greater than the average death rate of the United States; on the other hand, it is less than many American cities.



PREVAILING DISEASES.

Gulha.—The pulmonary and enteric types of this disease, which is apparently peculiar to the Ladrone and Caroline Islands, are responsible for nearly one-fourth of all the deaths. Special reports on this diseases have been forwarded during the year.

Worm infection.—Thirteen per cent of the deaths were caused by intestinal worms and their results. This is due to the combined effects of polluted water (the principal source of which is shallow wells), the absence of sewers, and the fact that a large percentage of the native population are barefooted. That this condition is preventable is evidenced by the fact that worm infection is not usual among the naval forces, whose surroundings are sanitary. Were it not for persistent treatment by the medical officers of the navy, the mortality from these diseases would probably be double the present rate.

Tuberculosis.—Over 10 per cent of deaths have occurred from this disease. The island, owing to its relative humidity and large annual rainfall (116 inches), does not possess an ideal climate for the treatment of tuberculosis. It is difficult to impress upon the native mind the value of pure air in the treatment of the disease. The tubercular subject is not segregated from his family, and generally lives indoors behind tightly-closed doors, especially in the rainy season. Their natural resistance to the disease is apparently slight, and an unusually large percentage of cases develop about the age of puberty.

A pavilion for the treatment of tuberculosis would prolong the lives of the victims of this disease; cure, in this climate, is doubtful. The main advantage of such an institution would be in limiting the spread of the disease.

Leprosy and gangosa.—Congress generously appropriated \$15,000 for the care and maintenance of the lepers and "other special diseases" on the island. On the colonies for the reclusion of these diseases, hospitals and cottages have been built of sufficient capacity to care for all those suffering from the three diseases recludable by law—leprosy, gangosa, and rhinoscleroma. The total number of patients cared for in the colonies is 185, the great majority of whom are affected with gangosa. There are two cases of rhinoscleroma. Twelve deaths occurred in the colonies, nearly always from intercurrent disease. All persons suspected of being the subject of any of these diseases have been carefully examined during the year, and when found to be affected, were recluded.

In addition to the resident superintendent and guards, there have been added to the list of employees during the past year three dressers and a matron. The dressers are instructed by medical officers and perform very satisfactory work. Many cases of gangosa are improv-

ing under treatment, and it is highly probable that at least 10 per cent of the cases will be discharged as cured within the next six months. While further appropriation for the maintenance of these colonies will be necessary from year to year, it will be a decreasing one.

RESEARCH WORK.

The pathologist of the station. Passed Asst. Surg. A. J. Geiger. U. S. Navy, has been engaged during the greater part of the year in the investigation of the diseases peculiar to Guam, with gratifying results, adding greatly to our knowledge to these hitherto little understood diseases.

SANITATION FOR THE ISLAND.

During the year a code of laws pertaining to the public health has been compiled and awaits publication as a part of the codes of the island. Water-closets have been standardized, as shown in appended sanitary order marked "A."

An attempt is being made to locate an artesian cone, with which it is hoped to supply the municipality of Agaña with water.

The question of paramount importance is to devise means of relieving the congested municipality of Agaña by directing the population to the uncultivated interior of the island. The building of roads and establishment of schools in all parts of the island will tend to accomplish this end.

MEDICAL SERVICES TO THE NATIVES.

The medical officers attached to the station, five in number, are the only practitioners of medicine on the island. The service to the native population has been greatly simplified and systematized by the establishment of clinics at the local hospitals. Valuable assistance is given the medical officers by two native practicantes, who have been trained by members of the naval medical corps formerly on duty at this station. The majority of the obstetric cases are cared for by native midwives, who are possessed of more than average ability.

HOSPITALS.

The Maria Shroeder Hospital has cared for the native male population over the age of 12 at the hospital and dispensary, and the Susana Hospital for the women and children.

The Maria Shroeder Hospital is a wooden and concrete structure with a corrugated iron roof. Its dimensions are 100 by 54 feet, about two-thirds of which is occupied as the naval sick quarters. Its two wards are 38 by 22 feet, each having a bed capacity of 12. The ventilation is excellent.

The Susana Hospital is a concrete structure with a tile roof. Its dimensions are 72 by 40 feet, its two wards measuring, respectively, 27 by 22 and 18 by 22 feet. Both hospitals are the property of the island government. The Susana Hospital is supported by an allowance from the island government, the interest of an endowment by Mrs. Russell Sage, and the earnings of its pharmacy. The poor are cared for gratuitously; those who are financially able are charged 50 cents per day.

More than 1,200 individuals have been treated by the two hospitals, many of these on several occasions. By far the larger number of patients are young children treated for guha and intestinal parasites. These two institutions also perform the duties of emergency hospitals and infirmaries for the island. No difficulty has been experienced in inducing the natives to apply for medical aid, especially since they have been given the option of being treated at their homes, except in those cases where treatment in hospital is imperative. It had been the custom of treating hook-worm cases by thymol only in the hospital, but since the discontinuance of this practice and allowing the thymol to be given at the homes of the patients, the number of applicants for treatment has materially increased. No ill effects have been noted from thymol administration, as the directions for its use are usually implicitly followed.

The native nurses of the Susana Hospital for women and children are satisfactory. No difficulty is experienced in the carrying out of orders, and, all things being considered, they are probably more efficient than imported trained nurses would be. Living in their normal habitat and understanding the prejudices and peculiarities of their own people, they have immeasurable advantages. In a few cases wherein they may be deficient, the members of the hospital corps of the navy are always available.

The Maria Shroeder and Susana hospitals have met all the medical and surgical demands of the island. They are far from being ideal structures for tropical hospitals, and whenever funds are available their replacement by institutions on the lines of the naval hospital, Canacao, P. I., is earnestly recommended.

Four dressing stations, three of which have been installed during the year, are in operation in various parts of the island. Each is in charge of a member of the hospital corps. These stations are supplied with medicines and dressings and afford relief to the native population until the cases can be seen by a medical officer.

A small hospital for the segregation of persons suffering from contagious diseases other than leprosy and gangosa has been established near the Tumon colony. It will serve for 12 persons if required. It has not been called upon to care for more than two persons at the same time.

NAVAL FORCES.

Considering the location of the station, the health of the naval forces here employed may be reasonably said to be fair. With an average complement of 129, there have been 115 admissions to the sick list, with 1,851 sick days. Thirteen were transferred to hospitals and three were invalided from the service. There were no deaths. Of the 16 disabilities, but one-half of the number were from causes incident to service in Guam. Of the 115 admissions, 30 were attributable to tropic service. The large number of sick days due to gonorrhea are largely from cases contracted in Japan; the amount of venereal disease existing among the natives is strikingly small, and is the result of regular inspection of public women, and their segregation, when suffering from venereal disease, until cured.

The most unfavorable feature of this station is its extreme isolation. When residence here is protracted, continued segregation from a normal environment, with its attendant lack of human interest, is indirectly a more potent factor in the production of mental and physical impairment in the average gregarious American than the totality of the ills incident to climatic conditions. For this reason, it is recommended that service on this station be not continued over a period of more than eighteen months when not inconsistent with other units of military efficiency. A change of station, even to the Philippines, at the end of this period, would tend to prevent a lowering of the morale.

Numerous safeguards against tropical disease are afforded officers and men at this station, and few cases, unassociated with excessive indulgence in alcohol, occur. The island is, moreover, free from malarial disease, the mosquito host not occurring here.

All the public buildings are in good sanitary condition and well provided with drainage, sewerage, and ventilation. The marine barracks are overcrowded, but well ventilated by reason of excellent natural ventilation. A sufficient amount of water is distilled for drinking and bathing. All of the quarters occupied by the naval forces, with the exception of the marine barracks, are furnished with tanks, which collect during the major part of the year a sufficient quantity of rain water for bathing purposes. This is not practicable for the large number of men quartered in the marine barracks. The source of the water used in these shower baths is the Agaña River, a highly polluted, shallow stream. It is not improbable that the origin of the few cases of uncinariasis and amœbic dysentery occurring in this command is the use of this bathing water.

Drilling and practically all work involving sun exposure is performed in the early morning and the late afternoon; in consequence, there has been no admission to the list on account of sun exposure.

A.

DEPARTMENT OF HEALTH AND CHARITIES,
UNITED STATES NAVAL STATION,
Island of Guam, October 14, 1907.

SPECIAL SANITARY REGULATIONS FOR THE TOWN OF AGAÑA.

The sanitary regulations issued under date of February 1, 1906, and relating to the provisions of Executive Special Order No. 8, are amended to read as follows:

1. On and after February 1, 1906, every tenant or proprietor of property within the limits of the town of Agaña shall be held responsible for the sanitary condition of all privy closets for use on such property.

2. The following types of closets, properly kept, shall be approved:

Type 1.—Closets flushed with water and connected with the sewer or cesspool, when the plumbing is properly installed, and approved by this department.

Type 2.—Closets having a pail or other metallic receptacle; but excreta must at all times be kept free from offensive odors by a covering of earth or lime.

3. Earth closets or vaults are prohibited.

4. All closets of type 2 must be strong and permanent and placed in such part of the grounds as this department shall designate. They shall be kept in a state of good repair.

5. All closets of type 2 must have the contents removed at least twice a week, between the hours of 4 and 7 a. m. The receptacles shall be conveyed to the dump scows provided on the beach, carried out from the shore, and dumped at the places designated, immediately after which such receptacles must be thoroughly cleansed with sea water.

6. The deposit of human excreta within the limits of the town of Agaña in any place other than privy closets is prohibited.

7. Any closet specifically disapproved by this department, if not replaced by an approved closet within fifteen days after written notice of such disapproval, shall be replaced by the department of public works at the expense of the owner of such closet.

8. A closet serving as a model approved by this department will be exhibited by the department of public works.

F. E. McCULLOUGH,

Head of Department of Health and Charities.

GOVERNMENT HOUSE, *Agaña, Guam, October 14, 1907.*

The foregoing sanitary regulations are hereby approved. A violation of any provision of these regulations will be punishable by an executive fine of 5 pesos for the first offense and 10 pesos for each succeeding offense. All laws and orders now in force conflicting with the foregoing regulations are hereby rescinded.

L. McNAMEE,

Acting Governor.

EXECUTIVE GENERAL }
ORDER No. 132. }

GOVERNMENT HOUSE.
Agaña, Island of Guam, October 17, 1907.

It is hereby ordered and decreed that—

Sanitary inspectors are empowered to make arrests for violation of any sanitary regulation wherein the offense is punishable by an executive fine.

Arrests made after the hour of 4 p. m. and before the hour of 9 a. m. will be solely for the purpose of identification until the cases may be presented to the governor.

Whenever a sanitary inspector shall be unable to identify the offender, he may be committed to the island jail until such identification can be made.

Before making an arrest a sanitary inspector will be required to display a badge bearing the words "Sanitary Inspector."

All laws or parts of laws inconsistent herewith are hereby rescinded.

L. McNAMEE,

Acting Governor of Guam.

REPORT FOR THE YEAR 1908, BY SURG. G. L. ANGENY, U. S. NAVY.

* * * The climate of Guam has been fully described in previous sanitary reports, and little worthy of note can be added. The following record of rainfall and temperature from observations made at the Sumay Meteorological Station is, however, considered of interest:

Month.	Rainfall.			Thermometer, 1907-8.		
	1905-6.	1906-7.	1907-8.	Maximum.	Minimum.	Mean.
July.....	7.64	10.13	20.15	88.16	73.40	80.78
August.....	17.71	5.82	14.46	88.34	71.96	80.24
September.....	10.39	7.99	10.15	87.80	72.04	80.06
October.....	13.48	13.04	8.73	87.44	83.40	80.42
November.....	21.25	7.44	4.73	88.52	73.40	80.96
December.....	11.50	3.70	3.72	86.72	73.40	80.06
January.....	1.24	1.15	3.03	85.64	72.68	79.16
February.....	.08	1.30	.97	87.08	69.08	78.08
March.....	.91	2.58	.99	86.72	71.60	79.98
April.....	2.22	2.30	1.42	87.98	81.68	84.83
May.....	.50	3.79	2.10	88.88	74.84	81.86
June.....	2.31	5.12	4.89	86.18	76.28	81.23
Total.....	89.23	64.36	75.36			
Average.....	7.44	5.38	6.38	87.43	73.64	80.53

An average rainfall of less than 77 inches is, for the Tropics, exceedingly low. As most of the rainfall occurs in sharp showers, and much of it at night, there is, as a consequence, a high percentage of sunshine. Notwithstanding this, no case of illness has been observed during the past two years that could be attributed, even indirectly, to the effects of sunlight.

It would seem that the mental and physical deterioration of the whites in the Tropics, ascribed by some writers to the effects of sunlight, and the subject of so much discussion during the past few years, could more logically be attributed to other causes, such as isolation, lack of healthy recreation, the enervating effects of a continuous summer temperature, gastric disturbances resulting from overeating and drinking large quantities of iced liquids, and, most of all, alcoholic intemperance.

The sanitary condition of Agaña, in which most of the naval force and naval administration buildings are located, is very satisfactory. The degree of cleanliness is very far in advance of that of the average

tropical town, and exceeds that of most of the towns of the United States of equal size. Although more than three-fourths of the entire population reside here and there is seemingly considerable overcrowding, no illness has occurred that could be attributed to this cause. On the contrary, the ratio of sickness among the residents of the town is much lower than that of the outlying districts. This is especially true of yaws, gangosa, and tropical ulcers.

In the open-well water supply we have an insanitary feature that should be abolished. This can not be done, however, until a public water supply is furnished. Unfortunately, the several attempts to secure water by the sinking of an artesian well have been unsuccessful.

A project that contemplates the construction of a dam in the hills about 1 mile southwest of the town will, if carried out, furnish an abundant supply of good water. To accomplish this, however, aid from the Federal Government will be necessary.

An ample water supply and the extension of the sewer system are two very necessary public improvements, and must be accomplished before any marked reduction in the number of cases of acute intestinal diseases and the now almost general worm infection can be expected.

VITAL STATISTICS.

Population of Guam, December 31, 1908.....	12,034
Native population.....	11,636
Foreign (including naval forces).....	398
Increase in population since 1900.....	2,404
Births, 1908.....	551
Male.....	274
Female.....	277
Total deaths, 1908.....	300
Deaths, natives.....	298
Deaths, foreigners.....	2
Death rate, per 1,000.....	24.9

The causes of death have been as follows:

Guha, or epidemic asthma.....	61	Puerperal septicæmia.....	2
Tuberculosis.....	35	Paralysis.....	2
Entero-colitis.....	31	Senile debility.....	2
Dysentery.....	20	Inanition.....	2
Stillborn.....	14	Intestinal volvulus.....	1
Pulmonary congestion.....	9	Gangosa.....	1
Chronic nephritis.....	7	Ruptured uterus.....	1
Broncho-pneumonia.....	5	Carcinoma uterus.....	1
Anæmia.....	4	Gangrene of lung.....	1
Helminthiasis.....	3	Convulsions.....	1
Endocarditis.....	3	Suicide (hanging).....	1
Paraplegia.....	3	Fatty degeneration of heart.....	1
Septicæmia.....	2	Tetanus.....	1
Peritonitis.....	2	Leprosy.....	1
Congestion of liver.....	2	Other causes.....	24
Dilatation of heart.....	2	Unknown.....	54

PREVAILING DISEASES.

Guha.—Guha, or epidemic asthma, has contributed by far the largest number of deaths. There is a slight increase in the number of deaths from this cause over the previous year. This increase is, however, more apparent than real, as a number of deaths reported as from this cause would previously have been attributed to other causes, as worms, dysentery, entercolitis, or tuberculosis. The occurrence of an enteric type of this disease is open to considerable doubt. The gastroenteritis described as the chief symptom of this so-called "enteric" form is very similar to that caused by bad hygiene, excessive heat, and malfeeding.

The word "guha" is a Chamorro term meaning shortness of breath, from whatever cause.

Tuberculosis.—Tuberculosis continues a prominent cause of death. The natives show an unusual susceptibility to this disease, and were it not for the fact that they live an almost constant out-of-door life the number of deaths from this cause would undoubtedly be far greater.

Entercolitis.—This disease occurred in epidemic form during the months of July and August and was attended with a very high mortality. The epidemic was probably due largely to the shortage of rice in the island at that time. The victims were almost invariably children under 4 years of age, and with few exceptions a history of malfeeding could be elicited. This is not to be wondered at when it is considered that the children here from the time of their weaning are dependent for their nourishment upon the articles of diet eaten by their parents, milk being not only rarely obtainable but of such poor quality as to be almost devoid of nourishment, and infant foods being practically unknown.

Worm infection.—There were only 3 deaths attributed to worms, as against 30 for the preceding year. While it is impossible to demonstrate any reduction in the number of cases of worm infection, the individual cases appear to harbor fewer of these parasites than was formerly the case. We do not see here the severe cases of hook-worm infection that occur in some other tropical countries, Porto Rico, for instance; cases there, as a rule, averaging more than ten times the number of worms found in the cases in Guam. The improvement here has undoubtedly been brought about, in a great measure, by the sanitary regulations relative to the disposal of human excreta, and the continued enforcement of these regulations will, it is hoped, eventually practically rid the capital town of cases of worm infection.

Gangosa and leprosy.—The colony for the reclusion of lepers and gangosa patients continues to claim much of the time of the medical



Street in Lepiraya, Sangora Colony, Borneo.

officers on duty at this station. The reservation is located about 5 miles from the naval administration buildings, and part of the way is over an extremely heavy road along the beach. To direct the proper treatment of the patients, it has been necessary for a medical officer to visit the colony from two to three times each week. One chief dresser is employed at the colony, and assistant dressers to the number of four have been selected from among the inmates.

The following is the statistical record of the colony for the year 1908:

Number of inmates December 31, 1907.....	185
Recluded during 1908.....	8
Total	193
Provisionally released during 1908.....	80
Died during 1908.....	12
Total	92
Remaining in colony on December 31, 1908.....	101

Fifty-one of the cases now in the colony were originally segregated as lepers, but repeated and careful examinations made during the past year by different medical officers has confirmed this diagnosis in only 17 of this number. Four others are regarded as leper suspects, but the remainder should be looked upon as cases of gangosa. Although neither the nose nor the pharynx is involved in many of them, the skin ulcerations appear to be, in every way except in location, identical with the ulcerative processes of typical gangosa. Cases have been observed in which the disease, beginning in the nose, involved, by direct extension, the face, neck, shoulders, arms, and chest. Very rarely does it involve parts of the body ordinarily covered by the clothing.

With few exceptions, all the gangosa cases are improving, and in at least 20 patients the lesions will be entirely healed within the next six months. Cases in which the healing is complete are provisionally released from the colony. (See appended form marked "B.") The provisions of the release are that they carry out faithfully the treatment prescribed by the health officer and that they report regularly the first day of each month for inspection. Patients who fail to comply with these provisions are returned to the colony. In some cases the mutilation is so extensive that they will have to be cared for indefinitely in the colony.

The treatment has been similar to that used for chronic phagedenic ulcerations from other causes. In the nose and pharynx, applications of phenol and nitric acid, trichloroacetic acid, saturated solutions of silver nitrate in 10 per cent nitric acid, and strong solutions

of formalin, 1 in 8, are the varied treatments that have been followed by good results. On account of the attendant swelling and distortion of the parts, it is frequently difficult to reach all of the lesions. The applications must be repeated a number of times, and cleanliness maintained, during the after healing, by spraying with antiseptic solutions, such as weak formalin and liquor creasolis compositus. On the skin surfaces, curettment, followed by a thorough application of the paquelin cautery, or phenol and nitric acid; direct applications of phenol and nitric acid and the saturated solution of nitrate of silver in nitric acid, are the measures employed. In extensive superficial skin lesions, the mercurial preparations in the form of ammoniated mercury ointment, or blue ointment have given excellent results.

Applications of tincture of iodine have not done well, nor has any apparent improvement followed the administration of iodide of potassium. The after healing is at best long and tedious, and recurrences of the ulcerations, at the margin of the scars, are frequent.

During the past year an organism has been described as the causative agent of gangosa. This so-called gangosa bacillus has, however, been found in a great variety of conditions, both normal and pathological, and probably has no relationship to the etiology of gangosa. It is present in almost all superficial ulcerations, of whatever nature, in infected wounds, in herpes simplex, and other similar conditions. The bacillus is also the alleged cause of guha. Experimental work, done by Asst. Surg. R. J. Straeten, U. S. Navy, would indicate that the organism is nonpathogenic and very widespread in Guam. Living cultures of what was declared by the author of the original paper to be a typical strain of the gangosa bacillus were used in this work, and the experiments were made on dogs. The natives declare that dogs suffer from guha in the same manner as themselves. Inoculations into the abraded skin were negative, the wounds healing within a few days. Subcutaneous injections of an emulsion of an entire twenty-four-hour agar slant growth in saline solution, produced a swelling which ruptured on the third day, discharging a clear serum, and thereafter healed promptly. Intravenous and intraperitoneal injections of emulsions of living bacilli produced no other symptoms than a condition of lassitude for several days; the animal thereafter appearing in normal health, and was alive and well six months later. Cultures from 14 normal throats gave positive growths in six instances.

A conservative estimate places the number of cases of gangosa in Guam at 250. There are indications that the disease is on the decrease. It is much more prevalent in the outlying districts than in the capital town. Agana, with more than three-fourths of the entire population of the island, has contributed only two of the nine new cases that have occurred during the past year. * * *

B.

GOVERNOR'S OFFICE, GOVERNMENT HOUSE,

Agana ----- 190--

You are provisionally released from reclusion at the ----- Colony on the following conditions:

1. That you report to the health officer on the first day of each month for examination.

2. That you faithfully follow the treatment prescribed by the health officer.

If the conditions are not strictly followed out you will be sent back to the ----- Colony for reclusion.

If these conditions are strictly followed a further recommendation from the health officer may result in your permanent release from the ----- Colony; much therefore depends upon the care with which you carry out the instructions given you.

Governor of Guam.

O

NO. 4

VOL. 3

UNITED STATES NAVAL MEDICAL BULLETIN

FOR THE
INFORMATION OF THE MEDICAL
DEPARTMENT OF THE SERVICE

LIMITED TO PROFESSIONAL MATTERS AS OBSERVED BY MEDICAL
OFFICERS AT STATIONS AND ON BOARD SHIPS IN EVERY
PART OF THE WORLD, AND PERTAINING TO THE PHYS-
ICAL WELFARE OF THE NAVAL PERSONNEL

OCTOBER, 1909

(ISSUED QUARTERLY)



WASHINGTON
GOVERNMENT PRINTING OFFICE
1909

Harvard College Library

NOV 8 1909

From the
U. S. Government.

NAVY DEPARTMENT,
Washington, March 20, 1907.

This United States Naval Medical Bulletin is published by direction of the department for the timely information of the Medical and Hospital Corps of the Navy.

TRUMAN H. NEWBERRY,
Acting Secretary.

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PREFACE.

The publication and issue of a quarterly bulletin by the Bureau of Medicine and Surgery contemplates the timely distribution of such information as is deemed of value to the medical officers and the hospital corps in the performance of their duties, and with the ultimate object that both shall continue to advance in proficiency in respect to all of their responsibilities.

It is proposed that the Naval Medical Bulletin shall embody matters relating to hygiene, tropical and preventive medicine, pathology, laboratory suggestions, chemistry and pharmacy, advanced therapeutics, surgery, medical department organization for battle, and all other matters of more or less professional interest and importance under the conditions peculiar to the service and pertaining to the physical welfare of the naval personnel.

It is believed that the corps as a whole should profit, to the good of the service, out of the experience and observations of the individual. There are many excellent special reports and notes beyond the scope of my annual report being sent in from stations and ships, and by communicating the information they contain (either in their entirety or in part, as extracts) throughout the service, not only will they be employed to some purposes as merited, but all medical officers will thus be brought into closer professional intercourse and be offered a means to keep abreast of the times.

Special attention will be given by the instructors of the Naval Medical School to the review of advances in medical science of special professional interest to the service, as published in foreign and home journals, and extracts from these will appear in the bulletin, together with such remarks as the instructors may deem of value to officers on foreign service or sea duty.

Information received from all sources will be used, and the Bureau extends an invitation to medical officers to prepare and forward, with a view to publication, matter on subjects relating to the profession in any of its allied branches.

P. M. RIXEY,
Surgeon-General U. S. Navy.

SPECIAL ARTICLES.

THE HOSPITAL CAMP AT NORFOLK, VA.

By Medical Inspector P. A. LOVERING, U. S. Navy.

In October, 1907, it became necessary to vacate the naval hospital at Norfolk, Va., which was turned over to the George A. Fuller Company for remodeling, and consequently to provide suitable accommodations for the sick for a period of at least one year. The only building available for use as a hospital was the old pesthouse, about 750 feet west of the hospital, built originally for contagious diseases, but occupied for years by civilian employees. This building was in poor repair and when crowded could not hold more than 30 patients. It was decided to use this house as the central administration and hospital building and around it as a base or center to establish a camp which could be enlarged as occasion demanded.

The pesthouse was thoroughly repaired and a small extension added containing the necessary bath and toilet rooms. The greater part of the woodwork was torn out and renewed, the walls and ceilings newly plastered, and steam heat and electric light introduced. The kitchen was taken for an operating room and equipped with the furniture which had been used in the hospital. The single large ward held 20 beds and was used for the more severe cases, both medical and surgical. The rooms in the front of the building were fitted for the necessary offices and for a dispensary. In the rear of the central building about 50 feet distant was built a wooden house containing a kitchen, dish-washing room, and a commissary storeroom, with an adjoining ice room.

In the kitchen was placed a Sexton range and broiler, with the coppers, boilers, urns, hot-water heater, and other equipment which had been used in the hospital. The kitchen, although hastily constructed, answered the purpose very satisfactorily and supplied all the food for the patients, nurses, and other persons connected with the hospital. The average number fed was about 200, but this number was frequently exceeded, and as many as 250 or 260 were subsisted. About 200 feet in front of the main building were put up two small buildings for lavatory and toilet purposes. To these buildings were removed the necessary bowls and tubs from the hospital and

drains laid to the river, which was less than 100 feet distant. The main building held but 20 beds, and it was necessary to provide 100 additional beds for patients and nursing staff, together with a suitable mess room. While the average number of patients averaged about 100, it varied greatly, at times reaching 150; and it was thought best to adopt some plan which would permit ready extension when occasion demanded. It was decided that a camp of tents afforded the best solution of the problem, and this camp was established on the west side of the main building, about 20 feet distant from it.

This original camp was composed of 24 tents, arranged in 6 parallel rows or sections, each of 4 tents about 15 feet apart. The sections had wood floors raised $2\frac{1}{2}$ feet above the ground and substantial wood frames, over which the tents were pitched. The sections were heated by double rows of steam pipes running along the floors under the foot of the beds and were comfortable all through the winter and spring. They were lighted by electric light, which was safer and more satisfactory than lanterns. The section nearest the kitchen was used as a mess room, and the remaining 5 sections were occupied by patients and nurses. As the tents supplied would each hold 5 cots or 4 iron bedsteads, accommodation was thus obtained for about 80 to 90 persons. The end tent in the sections occupied by patients was generally used as a dressing room for surgical cases or contained medicine and clothes lockers. This camp of tents, which were permanently erected, was occupied by patients suffering with the less severe medical and surgical diseases and with venereal affections.

When the cold weather came and the usual eruptive fevers appeared, it was necessary to pitch still more tents and a temporary camp for contagious diseases was established. The number of tents varied greatly, but during the winter averaged over 20 and at times reached 30, making a total of 54 tents in the permanent and temporary camps. These tents were pitched either separately or in twos or threes as the emergency demanded. They were all provided with wood floors and heated by oil stoves, so that they were comfortable to sleep in, although in extreme weather a large amount of bedding was required to keep the patients warm. In the temporary camp were placed measles, mumps, scarlatina, smallpox, cerebrospinal meningitis, and also such contagious diseases as tuberculosis, erysipelas, and scabies. Board walks were laid down in front of the tents and running to the mess tents and latrines.

The temporary camp was rarely the same two weeks in succession, as the tents required for the different diseases were constantly varying.

For a long time measles claimed the larger number of tents and later mumps were the most numerous. Tents were taken from the

measles camp, sterilized by steam and pitched for cases of mumps. The different diseases were separated as far as practicable and there were few cases where the disease appeared to be carried from one part of the camp to another, and in most of the cases it was due to violation of the prescribed quarantine regulations.

In the spring of 1908 a second building of wood was erected adjoining the original house. This pavilion contained two separate wards, each with 10 beds, with distinct closets and bathrooms.

When the camp was first occupied on October 11, 1907, the number of patients in the hospital was quite low, having been reduced by transfers to 69. From this date until February 17, 1909, when the hospital was occupied again, 1,392 patients were treated, and the average daily number under treatment was 99+, although at times there were 150 to 155.

With so many sick there was naturally a wide range of diseases, both medical and surgical. The general infective diseases were the most common, there being 252 cases of measles, 217 of mumps, 37 of scarlatina, 111 of typhoid fever, and 32 of pneumonia. Many severe surgical operations were successfully performed, including appendectomy and herniotomy.

When the hospital was reoccupied in February, 1909, the camp was continued, as there were 25 cases of mumps and 2 of measles under treatment, and it was uncertain how many patients would be received from the returning fleet, which arrived a few days later. It proved very fortunate that the camp was kept ready in all its details to receive patients, for they came in unexpected numbers. For weeks there were represented in the camp at the same time smallpox, measles, mumps, scarlet fever, and German measles. The smallpox was later transferred to the quarantine station at Craney Island, where there are good accommodations for this disease. The maximum number of sick in the camp was reached on April 27, 1909, when it contained 94 mumps, 69 measles, 4 scarlatina, 1 German measles, a total of 168, besides the nursing and commissary staff. This number gradually diminished, but on May 20 there were remaining over 70 cases of contagious diseases, and there is little prospect of closing the camp in the near future, as new patients are being admitted daily.

The attached sketch represents the camp as it appeared in April, 1909, when used solely for contagious diseases, when there were 53 tents pitched and in use in the permanent and temporary camps.

THE TEACHING OF TROPICAL MEDICINE OUTSIDE OF THE TROPICS.^a

By Surg. E. R. STITT, U. S. Navy.

A few years ago it was my good fortune to be advised by Professor Welch as to an advantageous course of work for one to pursue who desired to prepare himself for medical work in the Tropics, which, expressed in a few words, was to acquire a practical grasp of the problems of clinical bacteriology and to obtain a working knowledge of animal parasitology—the clinical experience to be gained later in the Tropics.

The value of such advice must be apparent to those who have been in the Tropics, where the practitioner versed in laboratory technique not only has a local reputation superior to that of the purely besides diagnostician, but, in addition, as regards an international reputation has the advantage entirely in his favor.

Before outlining the course which appears to me advisable for one to pursue in the study of tropical diseases it would seem best to bring out certain considerations which bear distinctly on the subject under discussion. In the first place, it must be recognized that the majority of diseases common to tropical pathology are more or less common to temperate climates, with this distinction, however, that they tend to show anomalous features. Again, that the overshadowing trio—tuberculosis, syphilis, and typhoid fever—must there be kept in mind even more prominently than in temperate climates, where there are fewer similar diseases to cause confusion.

The most conspicuous feature of tropical pathology is the great incidence of diseases due to animal parasites. These are favored, not only by reason of less inimical temperature environment for the particular parasite, but also because in the Tropics insect life flourishes and the opportunities for the transmission of diseases requiring intermediary hosts are greater. As regards bacterial diseases, it would seem that the more favorable conditions for the growth of saprophytes should be distinctly of importance in checking the development of the more delicate pathogenic organisms. The greater importance of bacterial diseases in the Tropics must therefore be a matter of neglect of hygienic principles rather than of a favoring climatic environment.

The work of Strong, Musgrave, and Clegg in the Philippines has shown that symbiosis is a factor to be taken into account in the production of pathogenic manifestations. Now, is it not reasonable to conjecture that many of the unexplained phenomena of various

^a Read at the sixth annual meeting of the American Society of Tropical Medicine, April 10, 1909, and published in New York Medical Journal, July 24, 1909.

diseases are due to this matter of association between animal parasites and bacteria—the resulting clinical signs differing from those usually recognized as belonging to the uncomplicated bacterial or animal parasite infection? With these general considerations in mind, it would seem advisable to treat the subject of a suitable course in tropical medicine, when such a course is not given in the tropics, under three general heads: (1) Laboratory instruction, (2) clinical teaching, and (3) didactic lectures.

Laboratory instruction.—This should embrace practical work in bacteriology, pathology, animal parasitology, and chemistry. In bacteriology the training should be in the direction of having the student become familiar with the normal bacterial flora of the parts of the body and the excretions and secretions usually studied in disease. The smearing of agar or glycerin-agar plates with the material to be examined gives only superficial colonies, which can be easily studied and isolated in pure culture without the confusion due to deep colonies, as is the case with poured plates. To those who have not done much work of this kind the limited number and the constant appearance of certain species from material from nose, throat, faeces, pus, skin, etc., is very striking. If the student is familiar with normal findings, the abnormal ones give little trouble.

In culturing faeces it is advisable to make use of some special plating medium. Of these lactose litmus agar is very satisfactory and easily prepared, or, with a little experience, that of Endo. Both of these media aid in the isolation of colonies by their giving variation in color. The brilliant green medium of Conradi, so useful in the isolation of typhoid colonies, will probably be found of great value in tropical work by reason of its restraining power over cocci and colon bacilli.

It is very important that the making of media be taught in a practical way, and, while the methods for making media as prescribed for water analysis are unnecessarily exact, yet, in one respect, equal care is necessary in clinical bacteriology—that is, in adjusting the reaction of media. Experience with students has taught me that variation from optimum reaction is often the basis of failure in culturing bacteria. The use of litmus milk and the simple Durham fermentation tube with glucose and lactose bouillon are of the greatest practical value in determinative bacteriology. Familiarity with the Gram method of staining and the use of the hanging drop preparation should be demanded. Now that animals can be easily immunized and kept at hand to furnish immune sera and when equally easily obtainable are dried immune sera perfect familiarity with the technique of both macroscopical and microscopical methods of agglutination should be required of the student. With a little practice the necessary technique is easily obtained.

With a coccus we can practically gain sufficient information from the smear direct from the material, stained by Gram, followed by culturing on agar or some special serum medium and dispense with the more elaborate outlay of media so necessary for the differentiation of the nonspore bearing bacilli. Hæmolytic characteristics and carbohydrate fermentations in the differentiation of cocci are of questionable practical value. Differentiation by gelatin liquefaction is of great value, but difficult of application in the Tropics. Bacteriology should appeal to the student as a real factor in diagnosis and not as something more or less theoretical. It were better to simply isolate and become familiar with a streptococcus plated out from the nasal mucus and a colon bacillus from the fæces than to run through fifty organisms in pure culture on a monotonous succession of media.

In pathology the training should start with the proper methods of making and staining blood smears. It is astonishing the frequency with which men presumably well trained fail in this respect. The matter of artefacts and unusual appearances is sufficiently frequent in good preparations and in poor preparations is a frequent explanation of the preliminary note which is not followed by succeeding reports. Differential counts are of great value in tropical work, and differentiation of the normal and pathological blood cells should be thoroughly taught. The differentiation of the large mononuclear and transitional (the macrophages of Metchnikoff) from the large lymphocyte may not be of peculiar value outside the Tropics, but when malaria, trypanosomiasis, and amœbiasis are involved such differentiation furnishes a useful diagnostic point. Romanowsky's method of staining is an absolute necessity in tropical work, and checked by the reliable hæmotoxylin and eosin staining gives one adequate means for the study of blood films. Where malarial cases are not at hand to furnish smears for the study of chromatin staining, which, however, are satisfactorily replaced by specimens sent from the Tropics, the blood of rats showing *Trypanosoma Lewisi* answers well. This infection is very easy to keep up in the laboratory. As more closely resembling malaria an infection with halteridium is a good substitute; more nearly resembling malaria, however, is proteosoma, which infection is easily kept going in canaries. The infection with *Spirochæta Duttoni* is also easy to keep up in a laboratory. Fresh blood preparations are of great importance, but more calculated to lead to errors of observation than stained films. The blood in malarial, trypanosome, and spirochæta infections should be especially studied with fresh specimens. With spirochætæ the dark ground illumination is a desideratum. It is an easy matter to study amœbæ, ciliates, and intestinal flagellates by means of cultures, but amœbic and flagellate infections are now so common since our occupation of the Philippines that the more satisfactory

material from a case can be readily obtained. The student should be taught some simple method of preparing tissues for paraffin in-bedding. By affixing sections to cover glasses or slides these may be easily stained in various ways. In the Tropics one should be prepared to stain sections not only with hæmotoxylin and eosin, but with thionin, Gram's method, acid fast staining, and Van Giesen's stain. The staining methods of Wright and Giemsa give good results. Now that certain flagellates are of such importance we should understand Levaditi's method.

In animal parasitology training in recognizing intestinal ova is easily accomplished by having formalinized fæces sent from tropical countries. The ova found in the fæces of various animals, especially the dog, cat, and rat, however, provide teaching material which is almost similar. The method of teaching animal parasitology in our laboratory as introduced by Doctor Stiles gives training only inferior to that obtained at human autopsies in the Tropics. Dogs and cats, after being killed at the municipal pound, are autopsied and the parasites studied in the fresh state. The most prolific animal in interesting parasites is the rat. At such an autopsy we are not only able to study the infesting fleas, intestinal parasites, and embryos of trichinella, but as well to learn the appearance of the normal rat, so that a plague rat would be recognized by the subcutaneous injection, mottled liver, infiltrated neck glands, and pleural effusion. Fleas, bedbugs, and lice are best studied by keeping them in a test tube until the contents of the alimentary canal have been evacuated, and then to drop them into hot 70 per cent alcohol. They are then transferred to acetone and afterwards to xylol and then mounted in balsam. The generic and species characteristics can then be satisfactorily studied. For ticks it is best to give a preliminary treatment with caustic potash solution before proceeding as stated. For the study of mosquitoes it is best to collect larvæ from the pools, and place them in large aquarium jars covered with gauze. The insects can then be observed and either studied or dissected after they emerge from the pupal state. It is astonishing in how short a time students are able to distinguish larval characteristics. The architecture of mental plates and the syphonic variations are so much easier to recognize than scale characteristics that it is a satisfaction to demonstrate larvæ to a class.

In the English schools of tropical medicine the chemical side of the laboratory work is less dealt with than the animal parasitology and bacteriological phases. In my opinion, with the development of simple methods for determining nitrogen eliminated as ammonia, of bile pigments, etc., and especially of reactions of the nature of the Cammidge reaction, many valuable diagnostic aids may be obtained. More expeditious methods of determining the digestive functions by microscopical examination of the fæces are more or less at the disposal

of one trained in the microscopical appearances of fæces. Schmidt's fermentation apparatus for determining errors in carbohydrate digestion is a method which should prove of value in the intestinal derangements of the Tropics.

A feature of laboratory instruction, considered by our students as of peculiar value, is the holding of frequent examinations in microscopical diagnosis. With a series of microscopical preparations embracing ova of parasites, various intestinal parasites, important insects and arachnoids, stained blood smears, pathological sections, bacterial preparations, and various artefacts, we have material to make one exercise common sense. The consideration of micrometry and the question of the limitations of the findings in certain material make one exercise judgment. The papers with the written diagnoses are handed in, the errors in nomenclature or terminology corrected, and a brief talk given as to justifiable and inexcusable errors in diagnosis.

CLINICAL TEACHING.

The idea prevails generally that ward class work is only practicable in the Tropics or in such hospitals as the Seaman's Hospital in London or the one in Hamburg, where many cases of tropical disease among the sailors of the steamship lines going to the Tropics are treated. While it is undoubtedly an advantage to have a class study an actual case of a tropical disease, yet, if such cases are not at hand, the lack of such facilities may in great part be compensated for by studying cases common to the temperate climates which are intimately connected with the differential diagnosis of the tropical disease in question.

A case of alcoholic neuritis when studied from the standpoint of the points of difference between it and dry beriberi will give the student almost as much information as the going over of an actual case of beriberi. A case of acute nephritis, when gone over from the standpoint of differential diagnosis, is only little less instructive than where the case is really one of wet beriberi. Various conditions giving enlarged livers can be used in clinics on liver abscess—large spleens to bring out the points of differential diagnosis in connection with kala-azar. Various tuberculous troubles may resemble Malta fever or quotidian types of malaria. A case of venereal adenitis may serve for a plague clinic, and in the various lesions of syphilis we have clinical material to utilize in bringing out the differential diagnostic points between the various tropical infectious granulomata and those of this widespread infection. A case of ptomaine poisoning gives a perfect picture of a mild case of cholera. When we consider that cases of dengue are frequently sent to hospitals by those unacquainted with the disease with diagnoses of influenza, measles, scarlet

fever, etc., it will be readily understood that cases with which to demonstrate the clinical picture of dengue are not lacking in the cities of the United States. A case of heat stroke has striking points of resemblance to certain cerebral types of pernicious malaria. In our southern cities many of the tropical diseases—as dengue, uncinariasis, and malaria—may be utilized directly.

DIDACTIC LECTURES.

In didactic lectures great stress should be attached to questions of geographical distribution and epidemiology. As with clinical teaching so in the lectures should points of resemblance of a tropical affection to some ordinary disease be brought out in contrast. Again, instead of detailing innumerable symptoms, the majority of which will more or less answer for any of a number of indispositions or diseases, it would seem advisable to pick out the five or six most characteristic features in the disease to serve as a solid framework for the students' conception of the disease. Let a student fix in his mind the sudden febrile onset, the anxious countenance shortly followed by a clouding of consciousness and thickness of speech similar to that of a drunken man, with the appearance on the second or third day of exquisitely tender lymphatic glands, and he has a picture of plague much more than if the hundred and one various minor features of the disease were detailed out to him in monotonous succession. While the epidiascope and projection apparatus are invaluable in lecturing, yet there are such things as word pictures. Bring out the fact of a mouth so sore that the lightest wine burns like brandy, then touch on the ulcerations of the mouth, the burning in the gullet on swallowing, the gastric and intestinal distress, and finally picture the repeated replenishing of the bedpan with a copious, putty colored, pultaceous, fermenting mass of fæcal matter, and the most inattentive student grasps the essential features of sprue. Present to the class a picture of a disease commencing with an erythema of skin surfaces exposed to the sun, gradually going on to an ichthyotic condition, of a spruelike condition, and finally of one partaking of the characteristics of a melancholic general paresis, and we have given a conception of the disease pellagra. It is a matter of the greatest importance in lecturing on diseases which, to the one who has not been in the Tropics, appear to have rather an abstract value, to bring out amusing incidents or ludicrous contracts. In lecturing to the class on Malta fever I referred to a conversation I had with Sir Patrick Manson in 1905 relative to a number of cases of this disease which had appeared in 1894 on the U. S. S. *Chicago*. The discovery of the probable cause in goats' milk had just been announced, and Sir Patrick assured me that if we had looked into the

matter of aetiology carefully we should probably have found that goats' milk was at the bottom of the outbreak. It was only necessary to suggest to the class the utter improbability of a lot of sailor men going ashore, in a European seaport, to revel in goats' milk, to thereby ineradicably fix in their minds the most important point in the epidemiology of Malta fever.

That this outline of a course in tropical medicine is entirely practicable is shown by the fact that it represents almost in detail the course in tropical medicine given at the United States Naval Medical School. In the work connected with bacteriology and animal parasitology it is certainly as thorough as that given at the London School of Tropical Medicine. In a recent article on the need for a school of tropical medicine in the United States^a the statement was made that the taking of the course at the London School of Tropical Medicine by surgeons of the army and navy of the United States was because tropical medicine was "not taught in this country with that particularity needed for success." While agreeing with the author in other respects, I should prefer to assign as the reasons for the taking of the course at the London School of Tropical Medicine the desire to take advantage of the teaching of that leader in tropical medicine, Sir Patrick Manson, and of the clinical material at the Seaman's Hospital, rather than to those given in the article.

ETHYL CHLORIDE AS A GENERAL ANÆSTHETIC.

By ASST. SURG. LUCIUS W. JOHNSON, U. S. Navy.

During the writer's terms of service as dental surgeon and as resident physician in the Philadelphia (Blockley) Hospital he had occasion to give ethyl chloride as general anæsthetic some hundreds of times for a great variety of operations; since entering the naval medical service he has been impressed by the great number of injuries and minor operations which, while extremely painful, were too brief to justify the use of ether or chloroform and for which ethyl chloride seemed to be the ideal anæsthetic.

Chloride of ethyl (C_2H_5Cl) is a colorless liquid with sweetish taste and aromatic odor: it boils at $10^\circ C.$ and evaporates rapidly on exposure to the air. It burns with explosive violence, producing hydrochloric acid.

In 1848 Heyfelder first used ethyl chloride as general anæsthetic, and after that many investigators experimented with it. Seitz, in

^aTobey, Need for a School of Tropical Medicine in the United States, *Journal of the American Medical Association*, April 3, 1909.

1892, reported 16,000 cases with but 1 death, and Ware, in 1901, reported a series of 12,436 cases with but 1 death. Several series of a thousand or more cases have been reported with no fatalities and entire absence of disturbing symptoms. The writer has neither observed or experienced any unpleasant effect during or following its administration.

The first effect of the inhalation of ethyl chloride is a decrease in arterial pressure and an increase in the rapidity of respiration, both due to central pneumogastric stimulation; the face becomes flushed, perspiration may appear, and the pupils dilate. In the surgical stage the pupils begin to contract, the breathing becomes stertorous, and muscular relaxation increases. The muscular relaxation and corneal anaesthesia are seldom so complete as under ether or chloroform. Cyanosis, dyspnoea, muscular spasms, and rapid, irregular pulse have been the symptoms noted as indicating a dangerous degree of narcosis. In nearly every fatal case respiration has failed some minutes before the circulation, and several patients have been revived by artificial respiration after natural breathing had ceased for some minutes.

The period of induction of anesthesia is 30 to 60 seconds by the closed method and about 45 to 60 seconds by the open method. The period of duration of unconsciousness after removing the anaesthetic is about 60 to 90 seconds. This rapidity of elimination greatly increases the safety of the drug since its deleterious effect ceases almost immediately when administration is stopped. The return to consciousness is followed by a period of analgesia lasting one to two minutes, during which stitches can be inserted or dressings applied without pain to the patient.

Ethyl chloride has been given repeatedly to all ages of patients from 24 hours to 88 years without bad effects. The position of the patient may be reclining, sitting, or semi-erect, as indicated by the nature of the operation.

The anaesthesia may be prolonged for an hour or more, but for long periods it is not so easily administered as ether or chloroform because of its greater volatility. If the operation is not completed during the first period of anaesthesia it may be safely repeated as often as necessary, allowing the patient to become partially conscious between periods of narcosis.

The amount given is usually about 5 c. c. for two to three minutes of anaesthesia by the closed method; by the open method a larger quantity is required; as high as 40 c. c. have been given for longer periods. After-effects are conspicuously absent; some cases have been reported in which vomiting has occurred, but they have been very few. The writer has never seen its use followed by anything

more serious than slight giddiness lasting for a few minutes; enuresis occurred in one case during the period of narcosis.

The administration may be by the open or closed method. In the closed method a special inhaler is used, consisting of a face piece connected with a rubber bag having an air valve; about 5 c. c. of the drug should be sprayed into the bag and the face piece applied just at the beginning of expiration; the air valve is kept open during the first breath or two and then closed so that the mixed vapor and air are breathed over and over. The patient should be told to raise the hand just before the inhaler is applied, when the hand falls and gentle snoring begins the stage of anæsthesia has been reached; the inhaler may then be removed and the operation commenced.

In the open method a compress of six to eight thicknesses of gauze may be laid over the nose and mouth and the drug sprayed upon this; care should be taken that the frozen moisture from the breath does not obstruct the patient's air supply. A cone may be made of a thin layer of cotton covered on one side with oil silk and on the other with gauze; this is folded into shape with the oil silk out, the drug is sprayed inside, and the cone applied to the face.

The writer has both taken and given the anæsthetic in each of the ways described and from both points of view prefers the closed method; the amount of drug used is less, the dilution of vapor is more accurately controlled, narcosis is more rapidly induced and is longer in duration.

Ethyl chloride is especially adapted for use in the naval and military services, being easily portable, safe, and rapid. In time of action small amputations, tying of blood vessels, removal of splinters, setting of fractures and dislocations, can be done on the spot painlessly and with great saving of time over chloroform or ether. Given preliminary to ether or chloroform the time of induction is greatly lessened by its use, the disagreeable and dangerous laryngeal irritation is avoided, the danger of shock is greatly lessened, and nausea during the period of recovery from anesthesia is done away with or greatly lessened. It can be administered by an inexperienced person, in case of emergency, more safely and successfully than any other anæsthetic.

Summary: Ethyl chloride is peculiarly adapted for use in the naval medical service for the following reasons: (1) Simplicity and ease of administration; (2) safety in administration; (3) rapidity of induction of anesthesia and rapid recovery; (4) absence of unpleasant after-effects; (5) lessening of shock; (6) the absence of laryngeal irritation; (7) cheapness and portability; (8) given before ether or chloroform it lessens time, danger, and the unpleasant sensations of the patient.

It may be used in operations for hemorrhoids, nose and throat work, opening of abscesses, dental work, dilating strictures, opening buboes, dressing painful wounds, setting fractures and dislocations and preliminary to other anesthetics.

CHRONIC NEPHRITIS IN RECRUITS.

By Passed Asst. Surg. B. F. JENNESS, U. S. Navy.

With the advent of the modern navy from a view point of fighting efficiency, and the enlistment of a greater personnel, has come the demand for a more intelligent, better educated, and healthier type of man. The stress of peace in our navy to-day requires the highest physical condition of its men, and with such qualification the average youth can, by keeping within the bounds of the prescribed life of the service, maintain health and become an active part of the national military organization.

The Medical Corps of the Navy exists to further every effort of the Government to raise the standard of its men, and it falls upon the members of this corps to turn away from the gate of our national defense the physically deficient who would gain entrance to the field, and there, through physical and military debility, cast discredit upon their country and upon themselves.

Our recruiting offices and training stations are every year putting out more sentinels and keener watches for disease, and through their vigilance and perseverance the "prior to enlistment" disabilities are decreasing, and the barracks of "call" men for the new ships are being filled with healthier recruits. Each year, however, crevices are found in the bulwark of inspection, and diseases are creeping into the ranks which do not become active until the stress of climatic influences or special duty have lowered the vitality of the recruit, and partial or total disability results. One of these diseases is chronic nephritis.

The average age of the recruit when enlisted covers the period of "children diseases," which include chicken pox, measles, scarlet fever, and perhaps diphtheria. This age covers also the period of puberty, and consequently a period when venereal disease, particularly gonorrhea, is frequent. Further, alcoholism is not an uncommon accompaniment of venereal disease, and the youths of our cities at the age of 17 years are not too young to have "sown their oats" to the extent of venereal and alcoholic excesses.

The diseases of childhood and the excesses of youth, together with the severe climatic conditions of many parts of our country, furnish us

a list of predisposing causes of nephritis which can not be disregarded, and the compulsory urine examination of all applicants for enlistment is a precaution which should be speedily adopted and rigidly carried out.

The diseases of children above mentioned are known to cause chronic nephritis, and the majority of our recruits have had one or more of these diseases before enlistment. Osler mentions nephritis as a complication of, or sequel to, measles, scarlet fever, influenza, whooping cough, and diphtheria, and he regards their importance as follows:

Nephritis is less rare in measles than is stated.

It is not very uncommon to see cases of chronic Bright's disease which date from an attack of measles.

Ten to twenty per cent of the cases of scarlet fever have nephritis.

Chronic parenchymatous nephritis is by no means infrequent in children as a sequence of scarlatinal nephritis.

Baumgarten has called attention to the frequency of nephritis in influenza.

Albumin is sometimes, and sugar frequently, found in the urine in whooping cough.

Renal complications are common in diphtheria.

Albumin is present in all severe cases.

These opinions are quoted, not to convey the idea that our men are coming up for enlistment living pictures of chronic nephritis, for the well-defined cases are recognized and rejected, but no one can say how recently an applicant may have had a scarlatinal nephritis or whether or not such disease has left organic changes.

Should a urine examination in each case be made in the recruiting office, and albumin found, the applicant would at least be held over and given a second examination, and a more careful history of the case would be taken.

The question of physiological albuminuria is still a disputed one, and Osler says:

The presence of albumin in urine, in any form and under any circumstances, may be regarded as indicative of change in renal or glomerular epithelium.

We can not afford, then, to allow men to pass examination for the service with albuminuria; much less can we afford to permit them to pass with no examination of the urine at all.

The leading insurance companies require an examination of the urine for policies of \$3,000 or over, and rejections are made upon the finding of albumin or sugar. They go even farther than this, and reject applicants whose immediate relatives have died of nephritis.

Should our standard of examination for public service be lower than that of an insurance company? Should we take men into a government organization for the protection of our country and for

service in all climates whom an insurance company would reject as a commercial risk?

It is not reasonable that we should reject all men with an unfavorable family history, for the term of enlistment in the navy is so short and occurs at such a favorable period in the life of the seaman that the chances of inherited disease becoming active within his period of enlistment are extremely few; but, as albumin in the urine in a case of insurance may mean chronic nephritis during the insured life of a policy holder, so may the same symptom mean nephritis in the enlisted life of the seaman; and, should he be admitted with albuminuria, no one can say at what hour, or under what stress of seafaring conditions, scarlatinal, diphtheritic, alcoholic, or venereal nephritis may be lighted up, and a supposedly healthy seaman become an invalid.

The chemical examination of the urine in our recruiting offices and training stations would throw much light upon the genito-urinary functions of our recruits. It would raise the standard of our requirements for admission and would eliminate another of the great possibilities of chronic disease in the ranks of our seamen.

SUPPLEMENTARY REPORT OF THE INVESTIGATION OF SAMOAN CONJUNCTIVITIS.

By Passed Asst. Surg. P. S. ROSSITER, U. S. Navy.

In May, 1908, a report was made of the investigation of Samoan conjunctivitis, which report was published in the United States Naval Medical Bulletin for October, 1908.

Although at that time the micrococcus in question was believed by the writer to be a previously undescribed organism, as its reaction to certain media (notably gelatin as to liquefaction and glucose as to acid production) were as yet undetermined, upon the advice of more experienced bacteriologists the probable identity of this organism with the *Micrococcus catarrhalis* was mentioned in the published report.

In the publication referred to, the characteristics of the causative organism of Samoan conjunctivitis were described as follows:

Small micrococcus about 0.6μ to 0.8μ in diameter; often seen as diplococci, and when so seen markedly resembling gonococci, the adjacent margins often being flattened.

Stains readily with usual stains.

Takes methyl violet to nearly black.

Is decolorized by Gram's method (control staphylococcus P. A.).

Grows readily on usual artificial culture media, as follows:

Agar plates: Colonies appear in 18 to 24 hours as small, raised, opaque, moist, rounded disks with undulate margins.

Agar streak: Abundant, raised, white, opaque, moist growth.

Bouillon: Uniform turbidity; fine granular precipitate after 3 days.

Potato: Abundant, raised, white, opaque, moist growth.

Milk: Grows readily, not coagulated after 6 days; no acid formation to litmus milk.

Fermentation: No gas production in bouillon fermentation tubes.

Gelatin: Grows readily in gelatin media, but data as to stab and plate cultures was not obtainable owing to high room temperature and lack of cold incubator.

This organism will retain its vitality on any of the above-mentioned media for months, if moisture is supplied.

Grows equally as well at room temperature—which, however, is high, 85°–95° F.—as at body temperature.

Pathogenesis: Found in all cases examined of Samoan conjunctivitis. Not found in healthy eyes.

I now desire to submit the results of further investigation of this organism as evidence that the causative diplococcus of Samoan conjunctivitis is not the *Micrococcus Catarrhalis*, but a distinct and hitherto undescribed organism belonging to the same group of Gram negative cocci.

1. In glucose media the *Micrococcus Catarrhalis* not only does not produce acid, but produces alkalinity.

On the contrary, in glucose bouillon and glucose milk the *Micrococcus* of Samoan conjunctivitis produces acid, as indicated by phenolphthalein in 24 hours and by litmus in 36 to 48 hours.

Glucose milk is coagulated in 48 to 72 hours with acid reaction to litmus.

Controls and counter controls were used in all cases, and all glucose media was incubated for 48 hours after the addition of the indicator, before inoculation.

2. According to "Muir and Ritchie" the *Micrococcus Catarrhalis* "grows on gelatin at 20° C. without liquifying the medium."

On the contrary, the *Micrococcus* of Samoan conjunctivitis grows on gelatin at 20° C., liquifaction beginning to show on the fourth to fifth day, at first saccate, and by the tenth to fifteenth day extending to the sides of the tube.

The treatment of the type of conjunctivitis caused by this organism, by the instillation of 5 per cent solution of Protargol, continues to be uniformly successful.

Solutions of the proper strength have been placed at various distributing points throughout the islands in the hands of reliable persons, and the disease is being rapidly exterminated in American Samoa.

Experiments were made by the use of a vaccine obtained from this organism, 25 million of the killed culture being introduced into the eye twice daily.

Although improvement was made in all cases by this treatment, yet the reaction was produced so slowly, 3 to 4 days, that it was abandoned for the quicker and equally sure Protargol method.

POINTS ON EMBALMING PRACTICABLE ON BOARD SHIP.

By Hospital Steward CHARLES SCHAFER, U. S. Navy.

Embalming may be successfully performed on board ship with apparatus either extemporized or at hand without any great amount of experience, providing care and patience be exercised. The appliances required are: A fountain syringe; a trocar (can be made from a silver catheter); a large aspirator (250 c. c. hard rubber syringe fitted to the trocar with a short length of heavy rubber tubing); two tubes, silver or of hard rubber, about $\frac{3}{16}$ inch outside diameter and about 4 inches long; two pinchcocks; two lengths of rubber tubing to fit $\frac{3}{16}$ -inch metal tubes; an 18-inch length of a stomach tube (a rectal tube will answer), and the embalming fluid which can readily be prepared by mixing 60 parts of official formaldehyde solution and 40 parts of saturated (1-16) aqueous solution of bichloride of mercury. The best results are obtained by embalming about three hours after death.

Immediately after death in all cases the eyelids should be closed and a bandage brought over the top of the head and passed under the chin to keep the jaw up and the mouth closed. Death having followed a noninfectious disease, after the removal of all clothing, the body should be thoroughly washed with soap and water, using only a soft wash cloth, and the face shaved if necessary. In the case of death following an infectious disease, after washing, the surface of the body should be thoroughly sponged with a 5 per cent solution of phenol.

To get really good results the body should be drained of as much blood as possible before injecting any fluid; this should therefore be done, if no autopsy is held, immediately after washing the body. The head and legs are slightly elevated and the body turned a little to the right, the right axillary vein is exposed, incised lengthwise and one of the metal tubes inserted toward the trunk and secured with twine, the free end of the tube is connected to a length of rubber tubing fitted with a pinchcock, the blood is allowed to drain into a receptacle, free drainage should be expedited by rubbing, manipula-

tion, and occasionally raising the extremities and trunk. The bladder should also be drained.

When the flow has ceased the body should be placed in a horizontal position, the drain tube closed by a pinchcock, but the connection not removed. The bandage about the head must now be removed, the mouth opened and the stomach tube, connected to the hard-rubber syringe, introduced into the trachea and about a pint of fluid slowly injected; a small amount of fluid, about 250 c. c., may likewise be injected into the stomach through the esophagus. The larynx is now packed with cotton moistened with embalming fluid, the mouth closed and the features made to assume as nearly lifelike an expression as possible. It is important that this be attended to before proceeding with the embalming on account of the hardening of the tissues. Any difficulty about keeping the lips together may be overcome by a modified subcuticular wire suture. The rectum is packed with cotton saturated with the embalming fluid.

The fluid may be injected into the iliac, femoral, or carotid, but is preferably injected into the axillary artery by gravitation from the fountain syringe from a height of about 4 feet. The artery is exposed, incised lengthwise, the metal tube inserted toward the extremity, properly secured, and about 250 c. c. of the solution allowed to flow. The tube is now removed and the artery tied about 1 inch below the incision, and through the same incision the tube is directed toward the trunk and about 1½ gallons of fluid injected, a quart at a time, with fifteen-minute intervals. To insure more permanent results the tube is left in the artery, closed with a pinchcock, and a second course of injections may be given after eighteen hours, and again a third thirty hours after the second. During the first, second, and third series of injections the pinchcock attached to the drain tube should be occasionally released. The amount of fluid lost through drainage should always be made up, so as to have 1½ gallons in the body when the operation is completed, the amount necessary to insure sufficient fluid to permeate the system. The tubes are now removed and the vessels tied. Aspirating for the removal of gases and secretions from the abdominal and other cavities should not be attempted until about eighteen hours after the first series of injections, when the body is firm and dry, and then a generous amount of embalming fluid should be injected into the cavities after the removal of gases and secretions. Aspirate only if necessary. The escape of fluid from the draining tube and the hardening of the surface are signs of complete embalming.

After an autopsy involving the removal of thoracic and abdominal viscera or when the circulatory system has otherwise been damaged, the arms and legs should be separately embalmed, the arms by inject-

ing into each arm through the brachial or axillary artery about 12 ounces of fluid and the legs by injecting into the femoral of each about 1 pint of the fluid, directing the flow in both cases toward the extremity. The head is taken care of through the carotid, by injecting upward about 1 pint. If the brain has been removed the space is filled with oakum impregnated with solution. The thoracic and abdominal cavities should be freed of all the organs and packed with oakum thoroughly moistened with embalming fluid. After the body has been stitched a quantity of fluid may be injected superficially in numerous places, using the hard-rubber syringe and a medium-sized hollow needle.

Any local discoloration by extravazated blood should be removed by rubbing, draining, or with a small aspirator. If the body has been properly drained in the beginning discoloration will seldom occur.

REVIEWS.

SURGICAL SHOCK: A REVIEW OF RECENT LITERATURE.

By Passed Asst. Surg. H. W. SMITH, U. S. Navy.

1. Cartwright Prize Essay, 1897. Experimental Research into Surgical Shock, 1899. Blood Pressure in Surgery, 1903.
2. Before the Harvey Society, 1907.
3. Contributions Dedicated to Victor Vaughan, 1903.
4. Archives of Internal Medicine, July, 1908.
5. Journ. Am. Med. Assn., 1907, XLIX, p. 840.
6. Am. Journ. Physiology, 1900, LV, pp. 283-289. Am. Journ. Physiology, 1907-8, XX, pp. 399, 444, 500.
7. Am. Journ. Physiology, 1907, XX, p. 74.
8. Am. Journ. Obstetrics, 1907, LV, p. 3.
9. Lancet, Aug. 26, 1905. Lancet, 1907, I, p. 1907.
10. Journ. Am. Med. Assn., 1909, I, p. 45.
11. Internat. Journ. Surgery, 1904, p. 378.
12. Lyon Med., 1904, p. 378.
13. Lancet, 1907, I, p. 1269.
14. Am. Jour. Physiology, Feb. and Apr., 1909. See also Naval Medical Bulletin, July, 1909, p. 284.
15. Journ. Med. Research, Apr., 1909. See also Journ Exp. Med., 1908, X, p. 782; Naval Medical Bulletin, July, 1909, p. 281.

Although the clinical state etiologically named "shock" has been recognized so long and with full appreciation of its frequency and gravity, the extent of our knowledge until recently was aptly summed up by Warren: "The condition has been regarded as a general depression of the nervous system, without any well-defined idea as to what the nature of the change was."

Since no gross or microscopic changes sufficient to cause death were discovered by the pathological anatomists of the last century, our knowledge advanced little at their hands. Certain theories, based on physiologic observations, were severally held by surgeons, but they were not supported by experiment or precise clinical observation. Crile was in effect the first to attack the subject by approved methods of experimental investigation, and any review of the subject starts naturally with the publication of his work in 1897 (1).

Crile used dogs in his study. He produced shock by various means and recorded throughout the experiments respiration, pulse, and blood pressure. By means of accurate observations he was able to measure the potency of various conditions and injuries tending to produce shock, assuming meantime that the fall in pressure was a

correct index of the degree of shock. These conditions which conduce to shock he called "factors." They are as follows:

Duration of operation: Involving as it does prolongation of trauma, of anesthesia, and of visceral exposure, themselves factors, is of importance.

Hemorrhage: Loss of blood always predisposed to shock. The output of the heart varies with the venous pressure, not the arterial, and venous hemorrhage was found to be the more alarming since the lack of blood was more immediately felt by the heart.

Temperature: Cold favored shock; this was particularly noticeable when there was exposure of viscera.

Anesthesia: The anesthetic alone was capable of inducing a state indistinguishable from shock. The effect of ether was slight; chloroform, on the other hand, was markedly toxic and was prone to occasion sudden heart failure. The respiratory indications were found to be in advance of any other signs in foretelling the tendency of the anesthesia.

Tissue involved: It was found that severe shock was developed promptly with severe injuries to certain tissues and much less promptly when other parts were subjected to the same trauma. In general, it appeared that the more abundant and the more highly specialized the nerve supply to a part, the greater was the tendency to shock when the part was injured. The abdomen, brain, testicles, and skin are so constituted that injury to them was very effective in producing shock; the muscles, however, and the bones might be vigorously traumatized with little effect. This observation is consistent with the well-known sequelæ of burns, involving large areas of the integument.

Areas of inhibition: Manipulations compromising certain regions, e. g., the larynx and the large nerve trunks, cause a sudden, sweeping fall in pressure, presumably due to cardiac inhibition. This is perhaps the same phenomenon described by other experimenters as "cardiac shock" and by Crile as "collapse."

Whatever the precise mechanism by which these factors enumerated may bring about shock, the result of their action may be perceived most conspicuously in the behavior of the vaso-motor system. The vaso-motor changes are considered by Crile the basis of shock and to them may consistently be ascribed all the phenomena observed.

The sequence of changes following prolonged abdominal injury may be summed up as follows: On the first receipt of the injury the pressure rises. When the abdomen is entered peristalsis has ceased and the contents are quiet. While the trauma continues the general pressure shortly reaches its maximum and then begins to decline; in the meantime the splanchnic vessels dilate and the great veins become engorged. When the state of shock becomes marked, the skin is pale

and bloodless; there is profound apathy and extreme motor weakness; the peripheral sensibility is diminished; the respirations are gasping; the pulse is rapid and apparently weak; the secretion of urine has ceased; absorption no longer takes place from the intestinal tract; the arteries are empty, and the great venous trunks are distended with stagnant blood.

The cardiac mechanism is not directly affected. The rapid action of the heart is due to lack of fluid on which to contract and to its efforts to maintain the falling pressure in response to stimuli from the anæmic centers. The blood remains in the veins and does not enter the heart; the heart has little fluid on which to contract, and hence injects little into the arteries. The weakness of the pulse is then due simply to the small amount of blood in the arteries. That the rapidity of the heart's action is due to these causes is indicated by the readily observed phenomenon following infusion or transfusion: the heart beat immediately becomes slow, full, and strong. Indeed the heart may be kept beating long after respirations have ceased and the vital centers become irreparably damaged. The animal, in other words, suffers fatal hemorrhage into its own venous trunks. The immediate cause of death is the failure of the medullary centers to resist the acute anæmia. This is what occurs under ordinary conditions. If, however, the general pressure be maintained at a normal level by means of clamps on the splanchnic vessels or by transfusion, yet death occurs from failure of respiration. (See Howell.)

Crile believes that the vaso-motor changes are the result of the exhaustion of the vaso-motor centers induced by over-stimulation, and cites the observation that when a condition of shock exists stimulation of an afferent nerve or further injury produces not the normal rise in pressure, but a sharp fall.

It is in harmony with this belief that cocainizing the nerve trunks absolutely prevents shock; by it the afferent impulses are blocked.

Crile's therapy is founded on this hypothesis of vaso-motor exhaustion. The drugs commonly used are not only inactive but are positively harmful in most instances.

Digitalis: The heart is not depressed or weakened in any way and a cardiac stimulant is not indicated.

Nitroglycerin, alcohol: These drugs, by dilating the peripheral vessels, further lower the blood pressure and hasten death.

Strychnia: This drug apparently acts in customary doses only on the sensory neurons of the cord and thereby heightens reflex irritability. This action is not stimulation. Under normal conditions strychnia may raise the pressure by facilitating the access of normal afferent impulses from the periphery. This action, in the presence

of suitable factors, obviously conduces to shock; it is precisely antagonistic to the blocking action of cocaine, and, indeed, Crile found that of deeply shocked animals those receiving strychnia died more rapidly than the untreated controls, or, if they survived, convalescence was much more prolonged.

Atropine, given before the experiments, was found to slightly lessen the tendency to shock.

Preventive: Avoid undue exposure of viscera and unnecessary duration of manipulations; use clean dissection; maintain suitable temperature surroundings; regard hemostasis most scrupulously. If the area involved be anatomically adapted to the procedure, cocainizing the nerve trunks absolutely prevents shock. Methods of maintaining the oxygen supply necessary for the centers are the pneumatic suit, elevation of the head of the bed, bandaging the extremities, abdominal compression, etc.

Ergot is not of great value in supporting the pressure in shock. Adrenalin is efficient, but its action is fleeting and administration must be continuous. Salt solution is good; it will not, however, prevent progressive lowering of the pressure if the causes leading to shock are allowed to continue. Transfusion of homologous blood will hold the pressure at normal level until immediately before death and it is also an oxygen carrier. It is the best single prophylactic and therapeutic measure at our command.

Shock, then, Crile considers due to an exhaustion of the vasomotor mechanism and is not susceptible to treatment by the so-called stimulants.

Collapse is immediate depression or death from injuries or operation due to one or more of the following factors: (1) Cardiac, (2) respiratory, (3) hemorrhagic, (4) vasomotor. The phenomena produced by the operation of these factors have so many points in common that they fall naturally into a group and would seem to be appropriately designated as collapse. Collapse, being due perhaps to strong inhibition in some cases, may properly be treated by stimulating measures.

Crile's later position (2) may best be indicated in his own words:

We shall assume as our premises that the fall in the arterial blood pressure is the essential phenomenon; that without a fall in the arterial pressure there is no surgical shock; that the fall in the blood pressure is due to traumatism of nerve tissue and to psychic stimuli. We further assume that the ultimate lesions of shock are the same as those of hemorrhage and that for all practical purposes the phenomena of shock are expressions of altered physiologic functions. We will assume that death from shock, like death from hemorrhage, presupposes the failure of the circulation, producing certain degenerations of the central nervous system (see Crile and Dolley); that there is, indeed, but little essential difference, except as to causation, between death from hemorrhage and death from shock. We will further assume that the fall in blood

pressure is mainly due to a functional impairment or breakdown of the vasomotor centers; that the heart and blood vessels are only secondarily affected, principally by reason of the anemia of low blood pressure; that the cause of the functional impairment or breakdown of the vasomotor centers is due in part to the progressive anemia of these centers, in part to the effect of excessive afferent stimuli, there occurring a species of vicious circle. We will further assume that these shock-producing afferent stimuli are but little influenced by general anesthesia, but are totally blocked by cocaineization of their conducting paths.

Crile further observes that the avoidance of psychic influences is important in the prevention of shock. Infectious disease weakens the resistance of the centers. Transfusion raises the pressure in all grades of shock, and in overtransfused animals it was found impossible to kill by shock alone.

Howell (3), disagreeing with Crile, believes that shock is a manifestation of powerful inhibition (see Meltzer) and moreover ascribes to the cardiac mechanism the more important rôle. He concludes:

1. Shock is characterized by a long-continued, low arterial pressure (vascular shock), due to partial or complete loss of activity of the vasomotor center, and by a rapid, feeble heart beat (cardiac shock), due in part at least to a partial or complete loss of activity of the cardio-inhibitory center.

2. Cardiac shock may occur more or less independently of vascular shock, but vascular shock is always preceded or accompanied by cardiac shock. The respirations in shock are diminished in amplitude and usually in rate.

4. The physiological evidence in experimental shock indicates that the condition is due fundamentally to a strong inhibition of the medullary centers (vasoconstrictor, cardio-inhibitory), leading to a long-continued suspension of activity, partial or complete.

6. Stimulation of sensory nerve trunks or sensory surfaces in an animal in a condition of shock leads to a further fall of pressure, and to this extent augments the condition of shock.

7. The blood of animals in a condition of shock has no toxic action when injected into the circulation of a normal animal.

Meltzer (4) recently reviewed previous studies in shock and cited some experiments which had a bearing on the subject of shock, although undertaken with another purpose. Meltzer rejects Crile's theory of exhaustion and believes that inhibition explains the phenomena. He found that peristalsis, visible through the intact abdominal wall, was immediately suspended by opening the peritoneum, free dissection of the abdominal wall, or of the skin alone. This was not due to pain, since cessation occurred after section of the cord. Exhaustion and overstimulation could not play a part after section of the cord or a slight dissection of the skin. In the case of the cæcum, at least, any adequate stimulus applied to the animal caused, by way of reflex to the spinal cord, an inhibition of movements. The splanchnic and perhaps the hypogastric nerves are inhibitory, as is

the vagus on the heart. This inhibitory tonus is present in the normal state and cutting the splanchnic causes an increase in normal peristalsis. Further experiments showed that there was also a peripheral inhibitory mechanism of unknown location, whether in peripheral ganglia, nerve endings, or muscle cells.

Cannon and Murphy (5) confirmed these observations. They found that crushing the testes stopped peristalsis, and, further, that there was some local inhibitory mechanism apparent after section of the splanchnic nerve.

Meltzer and Kast found that the sensibility of the visceral peritoneum, like the motility of the viscera, was abolished by exposure, and coincidentally there was a general lowering of the body sensibility and onset of apathy. Vascular and cardiac symptoms were not marked, hence the phenomena were not due to anemia or exhaustion. (See Henderson.)

In all experiments in which attention was directed to the subject, laparotomy and evisceration led invariably to a reduction in the sensibility of the skin and general apathy; both these conditions may reach a considerable degree of intensity, while the heart and blood pressure remain entirely unaffected. Meltzer generalizes as follows:

Any adequate stimulus will frequently cause a partial shock, with muscular relaxation and lowering of sensibility. With increase of stimulus or decrease of resistance a more or less complete shock develops, in which one or more vital functions are involved to a varying degree; sometimes the heart, sometimes the vascular system, sometimes the respiratory system, are predominately affected. All the various methods of producing shock represent in one form or another strong stimulation abruptly applied to a normally tranquil nervous system.

Ordinarily, stimulation results in an increase in activity. In shock, activity of the functions is depressed. Experiments show that dissection of the skin and opening the abdominal cavity result in a more active inhibition.

It is considered that the factors tending to produce shock act by favoring the development of all the inhibitory functions of the body. Inhibition makes its appearance first in the less vital functions, later in more vital and better protected functions. The early inhibition of the functions of lesser importance may be regarded as conservative. All functions are maintained on the dual principle of a well-balanced antagonism between excitation and inhibition. It is evident that this inhibition refers only to the primary manifestations of shock; other influences must become secondarily active.

Porter (6) and his associates take issue both with Crile and the supporters of the inhibition theory. Porter states that it is "impossible to draw correct conclusions from such experiments (on the production of shock), because they confuse hydrostatic, chemical, and nervous phenomena." He found, too, that "the numerous stimulations just described (such as Crile used to produce shock) uniformly failed to give a significant fall in pressure, nor have we been able to find in the literature any instance in which the stimulation of a nerve produced such a fall in a normal animal (this statement

does not apply to the fall due to stimulation of depressor fibers).” The fall in pressure following removal of the integument is due to dilatation of the vessels, it is claimed, and thus is hydrostatic and not necessarily due to the stimulation of the afferent nerves.

Porter approached his experimental study of certain vasomotor phenomena associated with clinical shock with two assumptions: First, that the results obtainable in animal experimentation may justly be utilized in solving problems in human physiology; second, that a system of recording the effect of stimulation on the blood pressure by noting percentile rise or fall is a truer index of the condition of the vasomotor cells than is the absolute change.

1. Porter divides the functions of living into two groups, one fundamental and necessary to life, the other accessory and representing the skilled movements of the mammalian cortex. He finds that in many widely separated species certain physiological functions, which we ordinarily class as “vital,” show the same reactions. These functions are probably necessary for the support of mammalian life, and their mechanism is probably identical in all species. The vasomotor system is an instance. In the species examined it behaved in the same way, and therefore the results obtained from studying its action in animals may justly be applied to human problems.

2. Each of the nerve chains that constitute the vasoconstrictor system has three neurons. The cell body of the first lies in the bulb, its axis-cylinder process ending in the spinal cord or in the bulb itself in physiologic contact with the second neuron. The cell body of the second neuron lies in the cord or bulb, but its axis-cylinder process leaves the cord and ends in physiologic contact with a sympathetic cell. This sympathetic cell is the third neuron. Its axis-cylinder process ends in the wall of the blood vessel. The bulbar cells or first neurons affect the blood vessels only through the second and third neurons; consequently, if stimuli which pass through afferent nerves to the bulbar cells call forth a normal change in the caliber of the blood vessels, the condition of the neurons must be normal. The depressor nerve connects with all the bulbar vasoconstrictor cells alike. The fall in pressure, caused by the stimulation of the central end of the depressor nerve, is therefore a quantitative test of the condition of all the vasoconstrictor neurons, those of the first order in the bulb and those of the second and third order, through which alone the bulbar neurons can alter the constriction of the blood vessels. If, therefore, the stimulation of the central end of the depressor nerve produces as great a fall of blood pressure during shock as before shock began, the condition of the three vasoconstrictor neurons must be normal even in shock.

Porter finds that upon the stimulation of an afferent nerve, the absolute change in pressure is unaltered until the pressure has fallen

to one-third below normal. The relative or percentile change—the true index of the condition of the vasomotor cells—increases as the pressure falls. This reflex fails only when the pressure reaches a stage at which anæmia of the vasomotor cells is certain; there is no evidence of a gradually increasing fatigue. It has been said that vasomotor fatigue is indicated whenever the blood pressure falls upon the stimulation of the sciatic nerve, instead of rising, as normal. Yet,

we have seen no instance in our own experiments, or in the literature, in which the blood pressure suffers more than the usual temporary fall in cases uncomplicated by inhibition of the heart, hydrostatic reduction, or anæmia of the bulb.

The hypothesis which constitutes the hitherto generally accepted definition of shock declares that the vasomotor cells are depressed, exhausted, or inhibited (see Howell; Meltzer) by excessive stimulation of afferent nerves; the fall in blood pressure and the accompanying symptoms are the result of this depression. The experiments cited demonstrate that the vasomotor cells are not thus depressed or inhibited, and experiments also cited show that extensive stimulation of afferent nerves does not materially lessen the blood pressure. It is also known that as yet there is no evidence to show that either the respiration or the temperature can long be altered by afferent impulses.

Sollman, Brown, and Williams (7) corroborate Porter's experience regarding the reaction of the vasomotor system to afferent impulses.

Corrosion, or mild or violent irritation of the gastric mucosa, submucosa, or serosa, or of the parietal peritoneum, has generally no acute reflex effect upon the blood pressure or respiration in anesthetized dogs. In the few cases in which a response was obtained, this was slight and about as often in the direction of an increase as of a decrease. A succession of violent irritant measures applied to these structures is also without definite effect on circulation and respiration, the observation extending over an hour.

Boise (8) and Malcolm (9) believe that the low pressure and venous stasis observed in surgical shock are the outcome of high stimulation of the center and a strong contraction of the heart and arteries. Boise concludes "that the circulatory conditions of shock are essentially and primarily a condition of tonic or spasmodic contraction of the heart, with probable coexistent contraction of the arterioles." Malcolm forwards the opinion that "(1) the peripheral vascular system is contracted in shock, and (2) a state of low blood pressure is thoroughly consistent with contracted peripheral arterioles."

These theories, if substantiated by experiments, would have an important bearing on the question of exhaustion. Seelig and Lyon (10) studied the condition of the vessels themselves by (*a*) visual inspection of the vessels—in the eye; (*b*) measuring the outflow of blood from an organ or extremity—femoral vein; and (*c*) measuring coincident variations in venous and arterial pressure. They conclude:

Just as Porter (*loc. cit.*) claims to show explicitly that the vasomotor center is not exhausted in shock, and, therefore, implicitly, that the peripheral vessels are not paralyzed, so we try to show explicitly that the peripheral vessels

are contracted, and implicitly that not all the vasomotor centers can be exhausted. The complexity of the vasomotor apparatus, with its multiplicity of centers, and the seemingly independent action of many of these centers, render it impossible to frame a satisfactory theory based on our results. This much may be said with assurance: If the work herein detailed stands the test of confirmation, then the doctrine that shock is due to vasomotor exhaustion must be revised.

Kinnaman (11) supposes that there is a disturbance in the thermogenic functions; Jaboulay (12), that the oxygen-carrying capacity of the blood is altered. Bainbridge and Parkinson (13) record two interesting cases in which the chromaffin tissue of the suprarenals was absent. Henderson (14) has adopted a not new theory of acapnia, and finds it satisfying. His conclusions are:

1. Acapnia, due to hyperpnea, plays an important part in the central inhibition of peristalsis occurring under surgical operations. Local acapnia, due to direct exhalation of CO_2 , is a factor in the loss of tonus in exposed viscera.

2. When loss of CO_2 , both by way of the lungs and by direct exhalation, is prevented, and the blood gases are maintained nearly normal, peristalsis can be directly observed in the stomach and in the small and large intestines.

* * * * *

4. Exposing the abdominal viscera to a current of air at body temperature, saturated with moisture, rapidly induces congestion and loss of tonus and motility.

5. Aeration of the viscera in this manner is an effective way of producing shock. Restoration of the body's store of CO_2 is effective as a method of relief from all except the extreme stages of acapnial shock.

6. These observations and others which are to be presented in later papers indicate that the CO_2 tension in the nerve centers and in the tissues and fluids of the body is a factor in the maintenance (in the broad sense) of the normal state of the same order of importance as temperature, oxygen supply, osmotic pressure, and the equilibrium of anions and cations.

Crile and Dolley (15) have undertaken what appears to be most important work on the pathological cytology of surgical shock, concerning themselves primarily with the Purkinje cells of the cerebellum. Dogs were chosen for the study chiefly because most of the present data concern them. The condition of shock was brought on by manipulation of the abdominal contents. Hemorrhage and infection were avoided.

In order to eliminate from the problem changes associated with cerebral anæmia and therefore only secondary to shock, in some animals examined the manipulations had not been carried to a degree sufficient to produce a fall of pressure; in others the fall of pressure had been prevented by transfusion. It will be seen that the study deals with the distribution of the intranuclear chromatic material, including all that takes the basic stain and of the extranuclear Nissl substance. Incidentally to the object of the investigations some light is thrown on the origin of the Nissl bodies. Authors' summary:

In brief, the following alterations are found in the Purkinje cells of the cerebella of dogs in various degrees of surgical shock produced by manipula-

tion of the abdominal contents. There are deviations from the normal amount of the intranuclear chromatic material and of the extranuclear, the so-called Nissl substance, and variations in the usual distribution of both. There may be an increase or a decrease in the amount, and both may occur in different cells of the same animal, depending on the duration and severity of the shock produced. The increase of the chromatic material appears to be the initial reaction, and is followed by a progressive decrease. The distribution of the increase of chromatic material is that of an animal under normal conditions. The distribution of the decreased amount can be followed in a definite sequence down to its complete disappearance, so that a close relationship appears to be established between the intranuclear and extranuclear chromatic material. It is interpreted as indicating that the Nissl substance is derived from the chromatic material of the nucleus. The Nissl substance is considered as an integral structural element of the nerve cell. There are three main stages in the progressive diminution of chromatic material which form the basis of the conception:

First. The disappearance of the extranuclear chromatic material.

Second. The using up of the diffused intranuclear chromatic material after it passes in turn into the cytoplasm, leaving the karyosome intact.

Third. The giving up of the chromatic material by the karyosome, which after diffusion into the cytoplasm also disappears entirely.

Differential counts of the number of cells in each animal belonging to these main and the intermediate stages afford a satisfactory correlation with the experimental variations.

Structural changes are also to be observed. The cytoplasm becomes edematous and vacuolated, leading to general disintegration of the reticulum, in which degeneration the nucleus shares. The cells may be doubled or tripled in size. In the increase in size, a functional hypertrophy appears to be a factor as well as hydropic degeneration; for the increase begins with a sudden jump in association, with definite indication of disturbed kern-plasma relationship, before degeneration is very noticeable. Appearances indicating actual rupture of the nuclear membrane and of the cell are not infrequently found.

The comparative study of experiments in which the factor of anemia was satisfactorily eliminated by the transfusion of blood from normal dogs shows the same succession of changes.

SUGGESTED DEVICES.

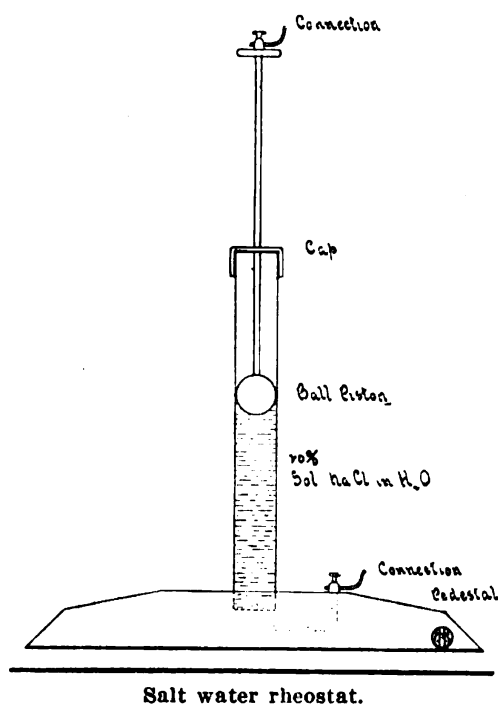
INSTALLATION OF AN X-RAY APPARATUS ON THE U. S. S. MARYLAND.

By Surg. A. FARENHOLT, U. S. Navy.

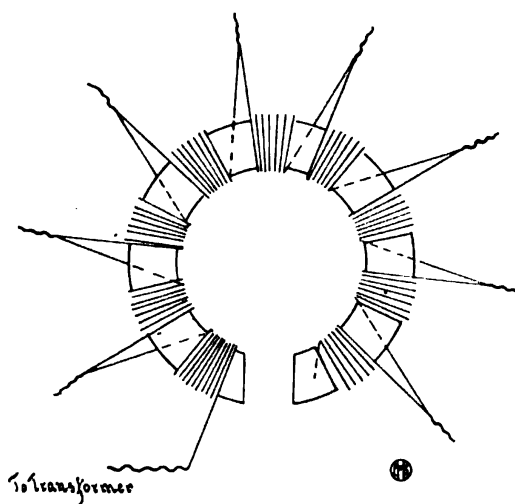
I have the honor to report that I have been able to improvise and to install in this vessel an apparatus by which practical X-ray work can be done. My first endeavor in this direction was to employ the especial appliances in use for wireless telegraphy, and I was able in this manner to obtain fairly good results notwithstanding the fact that the current is not adapted for this kind of work and that the life of the tube is therefore considerably shortened. The reason for this is chiefly that for wireless purposes the ship's 125 volts, direct current, before passing into the transformer (coil) is alternated by a motor generator which supplies interruptions of a character too low in frequency, 60 to 120 (generated by cycles of 30 to 60 per minute), to be of the proper value. The winding of the coil is not the most suitable, on account of the greater amperage necessary for wireless work. The Leyden jars used to give strength of impulse for discharges through the air are not needed for our purposes, and they have to be wholly or in great part removed.

For these technical reasons and the fact that it is frequently impossible to obtain the use of the wireless room and its apparatus, this method can not be considered as satisfactory or even practicable. While this vessel was recently under repairs at one of our navy-yards I was able to obtain a Massey wireless transformer (coil) of the old type, wound with No. 14 wire in primary and No. 36 in secondary, which works with 40 to 90 volts. While this article is the most important and expensive part of an X-ray installation, it is by no means the only one. In order to cut the ship's current of 125 volts to a working pressure of 40 to 70 volts a rheostat was made in the following manner: A length of 2 feet of a 2-inch brass pipe was mounted on a wooden pedestal; a brass ball was fitted into this tube and permitted to slide up and down as a piston by a rod which passed through a cap covering the top. The tube was filled with a 20 per cent NaCl solution in water and connections made at the brass rod and at the lower end of the column of salt water, inside the pedestal. With the aid of a voltmeter the necessary height of the column was easily ascertained.

It was now necessary to transmit the current thus lowered through a coil of variable inductance in order to counteract "counter



E. M. F." which is induced in the coil. This is also called a "choke coil," and is here used instead of Leyden jars. It has an additional use in assisting the rheostat to maintain a practically uniform amper-

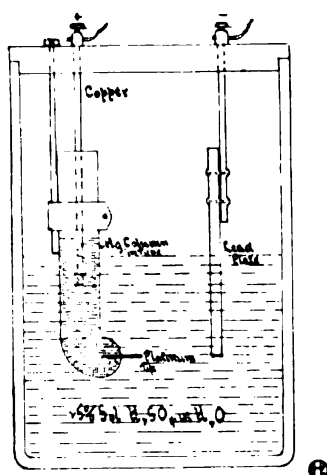


Coil of variable inductance (choke coil).

age. This coil was made by binding a horseshoe-shaped soft iron core with nine groups of windings and, by trial and error, determining the binding terminals which gave the best results.

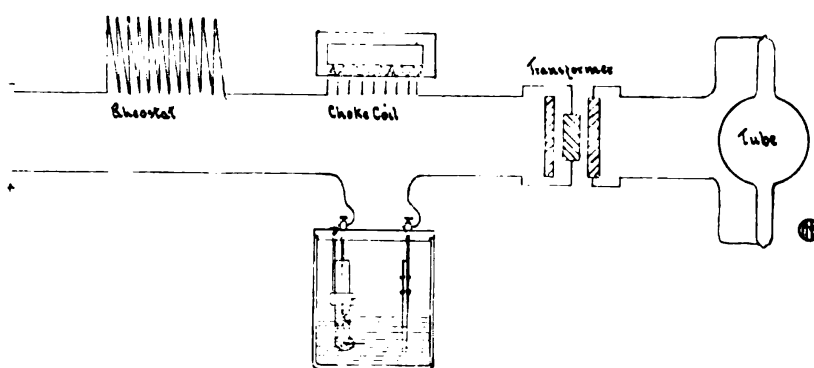
The ship's current being of the direct variety, it became necessary to interrupt it. This was accomplished by improvising an electrolytic interrupter in the following manner:

In a kitchen crock, or jar, of 1 gallon capacity was suspended, from a cover, a column of mercury made from an engineer's gauge glass fitted with a platinum tip taken from a platinum (bacteriological) rod and, by its side, a sheet of heavy lead; these were surrounded by a 25 per cent solution of H_2SO_4 in water. The distance these electrodes were placed apart and the angle at which the platinum tip was bent were determined by trial, but needed no fine adjustment. Diagrammatically this interrupter can be represented as follows:



Electrolytic Interrupter.

The various connections of these essentials may be represented in this manner:



Interrupter.

With these comparatively simple devices the ship's current is: First, properly standardized (reduced in this case) by the rheostat; second, prepared by the choke coil; and, third, interrupted by the electrolytic interrupter; it is then ready to pass through the coil by

which the desired secondary current is obtained and on which the spark gap is placed. The secondary voltage is about 25,000 to 30,000 and the amperage estimated to be from 1 to 2.

For operating an ordinary tube of 40 to 60 cm. in this manner the 40 to 70 volts (averaging 50) above referred to and 7 to 10 amperes suffice. The interruptions should be of 60 to 70 per second frequency. With the apparatus just described I have been able to obtain very satisfactory views of the bones of the extremities and fairly good ones of the shoulder, chest, and pelvis. As an aid to diagnosis it is extremely useful. It is always kept in working order and can be operated with no inconvenience. My coil not being of the best style for this work the secondary amperage runs a little too high, causing unavoidable heating of the tube; for this reason I do not use exposures of long duration. The definition and sharpness of the picture are, however, excellent.

METHOD OF FUMIGATION OF VESSELS AT HAMBURG.

Passed Asst. Surg. Victor G. Heiser, U. S. Public Health and Marine-Hospital Service, described in Public Health Reports for May 28, 1909, the following method of fumigation of vessels and destruction of rats and vermin which he found in use in Hamburg, Germany, upon a recent visit:

A new and improved apparatus has been devised which is believed to be thoroughly practical and economical, causing no damage to cargo and only slight delays to incoming vessels. Vessels having plague among the personnel and among the rats on board have repeatedly arrived at Hamburg, but there was no spread of the infection after the cases were isolated, and the rats and vermin destroyed by carbon gas.

Description of barge.—The hull is a steel vessel about 35 meters in length, with a beam of about 7 meters, and is about the type of hull used for tugboats in the large eastern ports of the United States. It has living quarters for a captain, a steam engineer, an electrician, two sailors, and one fireman. It is provided with baths, electric-light plant, ventilators, and all other necessary installations usually found on board vessels of this size for the safety and comfort of the crew. One cabin is set aside for the storage of several sets of divers' helmets, resuscitating apparatus, and other first-aid medical appliances. The midship section is used for the carbon generator and occupies about one-fourth of the linear length of the vessel. Cost of barge, with generator, complete, about \$32,500.

Description of apparatus.—It consists of (1) a furnace, or generator; (2) cooler and cleaner, or scrubber; a large iron cylinder through which the gases from the wet coke are forced from above; (3) exhauster, which draws the gas through the two parts named above and forces it to the place at which it is to be used; (4) pump, which forces the water that wets the coke; (5) engine, which drives the exhauster and pump. In order to supply the

necessary power cheaply, there is placed between generator and scrubber a (6) boiler, the steam in which is partly generated by the drawing of the hot gases through its tubes.

The apparatus is built so that the closed spaces upon a ship can be filled with gas, and that after it has served its purpose the gas can be displaced by forcing into the spaces ordinary atmospheric air.

The present apparatus is an improvement over one previously built, in that in the old system the gas in the apparatus was under pressure and any small leakage might have resulted in accidents more or less serious, while in the new the gas in the apparatus is under a minus pressure, owing to improved arrangement of the exhaustor.

Practical advantages.—The barge can be easily towed alongside of any vessel in the harbor. A large number of 15 cm. hose, in 20-meter lengths, are conducted from the barge through the ventilators, or other convenient places in the ship to be fumigated. All openings are carefully sealed, and as the capacity of the apparatus is 3,000 cubic meters of gas per hour even the very largest ships can be filled with gas in a few hours' time.

The gas is easily removed from ships by the ventilators, and by forcing into it, through the same hose which was used to introduce gas, fresh air, which readily displaces the gas.

The cost of material in generating gas is also very small, being only about 75 cents for sufficient coke to generate 1,000 cubic meters of gas, and \$1.50 for the remainder.

Rats killed.—Since this system has been used, 21 plague-infected vessels have been fumigated, from which 4,230 dead rats were taken, of which 171, or 4 per cent, were infected. On these same vessels 481 dead mice were found, only 1 of which was plague infected. The smallest number of dead rats upon any one ship was 16, and the greatest 902.

Character of cargo.—The cargo consisted of (a) bags: coffee, cacao, flour of different kinds, rice, wheat, corn, beans, potatoes, nuts, etc.; (b) barrels and boxes: wax, oil cake, rugs, metals, cigars, cigarettes, fresh fruits, raisins, senna, tripe, oak extract, oil, wine, etc.; (c) bales: wool hides, felt, tobacco, jute, rubber plants, cork, etc.; (d) in bulk: wheat, rye, barley, corn, hides, horn. None of the foregoing cargo was damaged.

Composition of gas and time allowed to remain.—Carbon monoxide, 5 per cent; carbon dioxide, 18 per cent; nitrogen, 77 per cent.

The gas is allowed to remain in a ship for 2 hours, and from 7 to 8 hours are allowed for it to leave it.

Accidents.—So far there have been 3 fatalities with the method employed at Hamburg:

1. One individual remained in the coal bunkers after all the personnel was ordered ashore.
2. One individual smuggled himself aboard as a stowaway after the introduction of the gas was already under way.
3. One individual went aboard without permission.

Passed and present methods employed to guard against accidents.—All of the crew are removed from the vessel. An engineer, a deck officers, and a sailor are left on the barge for the purpose of advising in case of need. Divers' helmets are always kept in readiness, so that the ship may be entered in case of necessity.

In the future it is purposed to add a very small percentage of sulphur dioxide to the gas, in order to give it an odor, so as to give warning to persons when they are in danger.

The superiority of the system described over the sulphur method depends on the fact that in quarantine practice vessels are constantly encountered which have cargoes of silk, camphor, tea, etc., which are damaged by sulphur gas, and the only way in which they can be fumigated with safety is to remove and replace the cargo, which is an expensive undertaking and a serious burden upon commerce.

AN OXYGEN APPARATUS.

The oxygen generator illustrated in the accompanying plate is described by its manufacturers to be—

A convenient, portable, and safe apparatus, about the size of an ordinary microscope case, for the generation of absolutely pure oxygen gas, at a moment's notice, in sufficient quantity for any ordinary chemical purposes, at any time or place.

The oxygen is produced by the action of water upon sodium peroxide, the reaction being $\text{Na}_2\text{O}_2 + \text{H}_2\text{O} = 2\text{NaOH} + \text{O}$.

The sodium peroxide is fused into a solid mass and is contained in small tin containers or cartridges, which being sealed with solder, preserve the contained chemical indefinitely, each cartridge being capable of producing 27 liters of pure oxygen, when punctured top and bottom and brought in contact with water inside the generator.

The apparatus consists of an outer cylinder about $9\frac{1}{4}$ inches in height, $3\frac{1}{2}$ inches in diameter, and a flange around top of cylinder bearing two clamp screws to retain the detachable top; an inner cylinder or gas retort open at lower end and closed at top but for the discharge pipe, which passes through and is firmly attached to the detachable top of the outer cylinder.

This discharge pipe is guarded by a needle valve for controlling the flow of gas. Beyond this valve the gas is conveyed through a wash bottle containing pure water to indicate the rapidity of flow of the gas, and then by rubber tubing to a nasal tip, or an inhaling cone. The wash bottle may contain ether or chloroform instead of water, if it is desired to give the anæsthetic with oxygen, the gas when given into the wash bottle being slightly warm and vaporizing the anæsthetic.

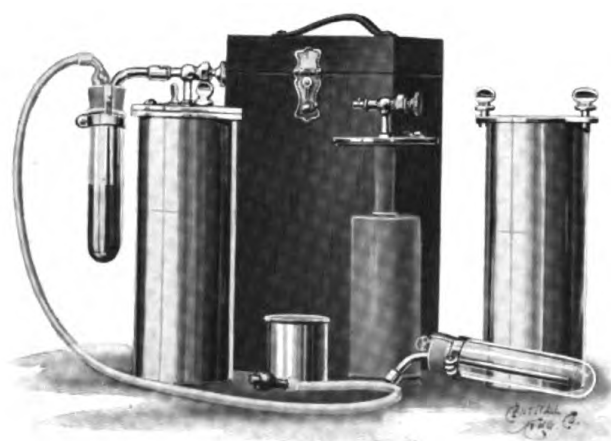
To operate: Fill the outer cylinder with water to a point indicated by a longitudinal mark on side of cylinder; puncture the cartridge containing the Na_2O_2 , top and bottom, so that water may enter; place cartridge inside the gas retort, where it is retained by a simply adjusted spring; lower the gas retort into the outer cylinder which contains the water and screw down clamps at top.

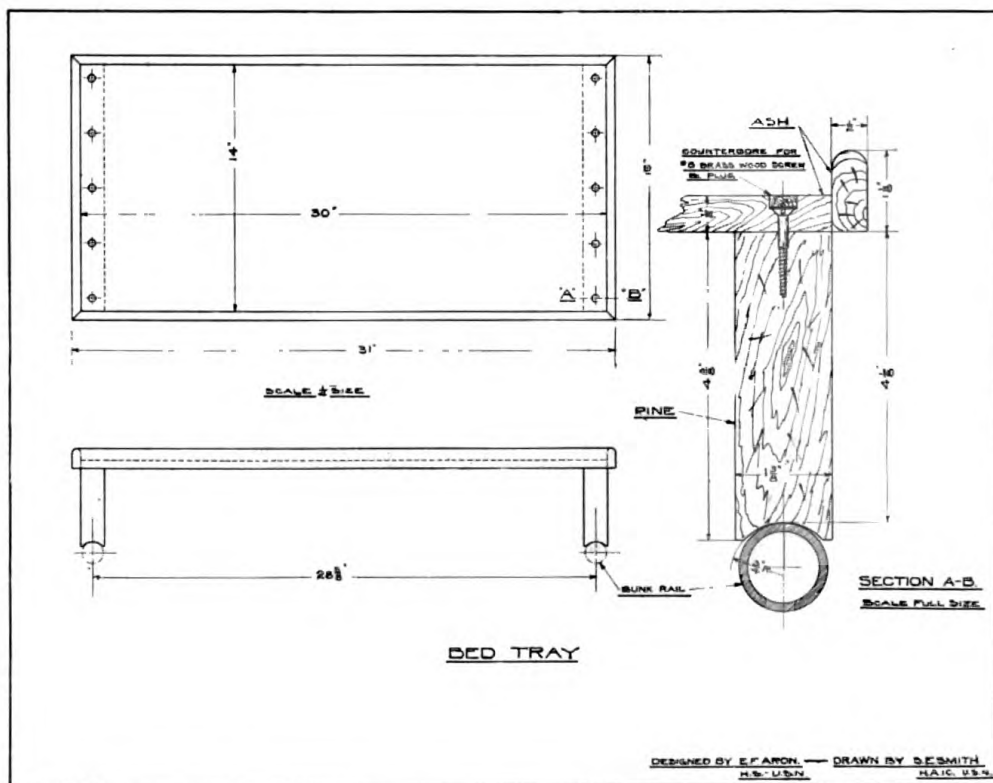
To start the generation of oxygen, open the needle valve, and the water then rises into contact with the punctured cartridge and oxygen is given off, the rapidity of flow being under perfect control by means of the needle valve. To stop generation, close needle valve, and the gas then forming in the inside cylinder forces the water down out of contact with the cartridge and generation is thus automatically suspended. A partly discharged cartridge may be retained in the generator for weeks or even months, ready to give off its residue of gas upon opening the needle valve again.

Thus there is no waste of material and no stale oxygen, the gas given off by the apparatus being always in the nascent state, and therefore always active clinically.

The advantages claimed for the apparatus are:

1. Availability—being ready for instant use in any emergency.





2. Purity and concentration of the gas, it being absolutely pure oxygen, with only a fraction of 1 per cent vapor of moisture, which is an advantage, moist gas being more active than dry, and more pleasant to inhale.

3. Control of the flow, the quantity depending entirely upon the will of the operator.

4. Economy: The cartridges cost \$4 per dozen, each developing 27 liters of gas, or 84 gallons for the whole dozen cartridges, which is approximately the equivalent to 210 gallons of the 40 per cent tank oxygen of commerce, with the additional advantage that there is no waste and never any stale oxygen left.

5. Nonirritating property: The gas being pure and moist, can be inhaled with impunity and produces no laryngeal or bronchial irritation, as so often is the case with oxygen made by the old process, not entirely freed from chlorine.

6. Durability: The apparatus will last practically a lifetime with fair usage and cleaning after use; the sodium hydrate solution does not corrode, but protects the steel cylinder and gas retort from rust.

7. Convenience and portability: The apparatus, complete with four cartridges, is contained in a case not larger than that used for a microscope and of about the same proportions, thus taking up little space.

The above-described apparatus is now being given a trial at several naval hospitals, with view to possible adoption for service needs.

AN EASILY CONSTRUCTED BUNK TRAY.

By Passed Asst. Surg. C. M. OMAN, U. S. Navy.

This device was suggested by Hosp. Steward E. F. Aron, United States Navy, serving on the *New Hampshire*, and is being used in the sick quarters with complete satisfaction.

The tray consists of a board with a small ledge around the sides of it made of ash, and two upright rests made of white pine. It can easily be made by the ship's force, is inexpensive, the material for each tray costing about 40 cents, light in weight, durable, compact, and can be stowed quite easily.

It can be kept in an absolutely clean and sanitary condition by scrubbing with sand and canvas, or by using vigorously salt water soap.

The tray was originally made for the purpose of feeding bed patients, but it has been found to be useful in many other ways. It rests firmly on the bunk rails and remains steady during the ordinary roll of the ship. It is very useful as a writing desk, as a tray for holding instruments and dressings in treating bed cases, and as a means of keeping the bed clothing elevated when necessary after certain operations.

CLINICAL NOTES.

OPERATIONS UPON THE KIDNEY.

(United States Hospital, New York, N. Y.)

By Surg. G. T. SMITH, U. S. Navy.

DECAPSULATION OF BOTH KIDNEYS FOR BRIGHT'S DISEASE.

M., N. C., seaman, age 26, a patient suffering from advanced parenchymatous nephritis, was operated on April 22 and June 22, 1909. At the first operation the left kidney was decapsulated and the right kidney decapsulated at the second. The improvement in this case has been continuous and most gratifying. The ascites, which was very marked, has almost disappeared, only remaining to a slight degree over the shins. His appetite is now excellent and his general condition good. He is now doing light duty in the hospital. His weight, which was 210 pounds before the operation, is now 170 pounds.

Urinalysis before operation: Sp. gr., 1.016; reaction, acid; color, yellow, cloudy; albumen present in large amount. The specimen nearly solidified on boiling. Casts of all sorts were present; also pus, mucus, and epithelial cells.

Urinalysis now shows: Sp. gr., 1.012; reaction, alkaline; quantity in twenty-four hours, 1,733 c. c.; color, clear yellow. Albumen present, but not so much as before operation. Hyaline and granular casts present.

In both operations the method of Edebohl was used.

EXPLORATORY OPERATION FOR HÆMATURIA.

M., L. A., machinist. The patient first noticed hæmaturia on April 17, 1909. He complained of uneasiness and a dull pain at times in the right loin and flank. Cystoscopic examination showed blood coming from the right ureter. Urine from the left ureter was normal. Examination of the urine from the right ureter showed a few blood casts and albumen. Catheterization of the right ureter and pelvis of the kidney failed to reveal stone. A radiograph was also negative for stone. After the usual treatment of rest in bed,

dieting, medication, etc., had been tried, on June 30 he was etherized and the usual oblique lumbar incision was made on the right side, and although a most thorough and careful search was made, the kidney could not be found.

The wound was then closed by layers and a dressing applied. The patient rallied well from the operation and the wound healed per primam. Strange to state, the urine gradually cleared up; but on July 30 his condition became worse, gradually failing up to the time of his death, August 25.

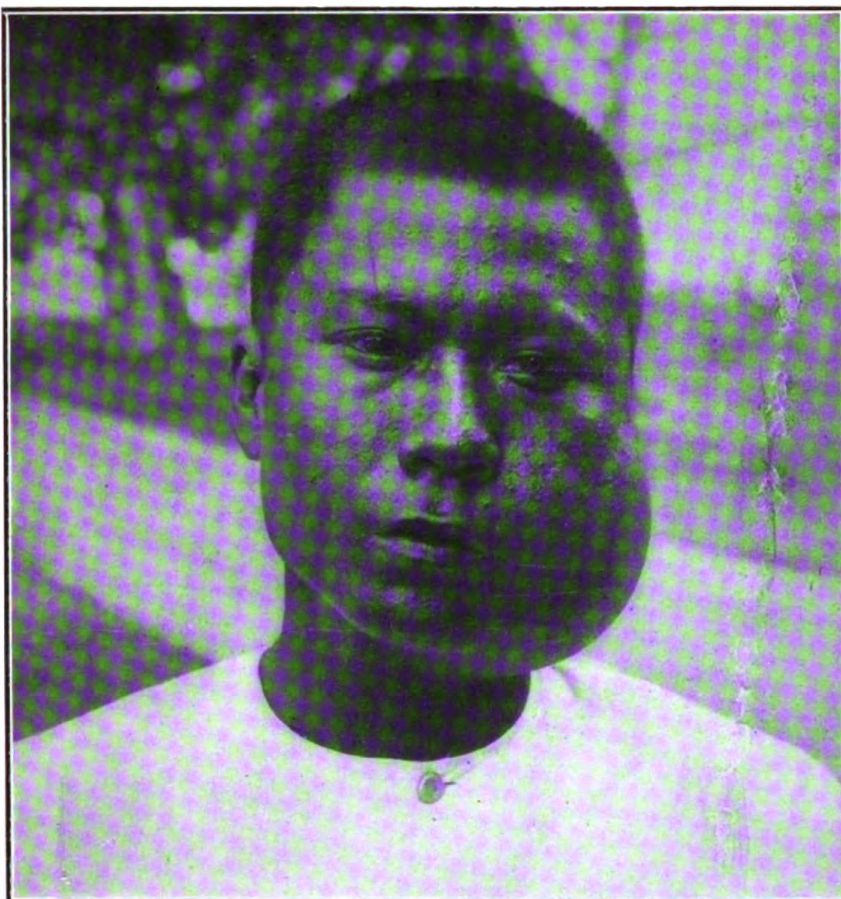
Autopsy showed a form of horseshoe kidney, the right and left kidneys being joined together and flattened, the whole mass bound down to the promontory of the sacrum in the middle line and quite small. The right kidney part of this mass showed acute nephritis, the pelvis of which showed patches of congestion. Heart showed a fibrinous pericarditis. Pleural cavity filled with clear straw-colored fluid. Other organs normal.

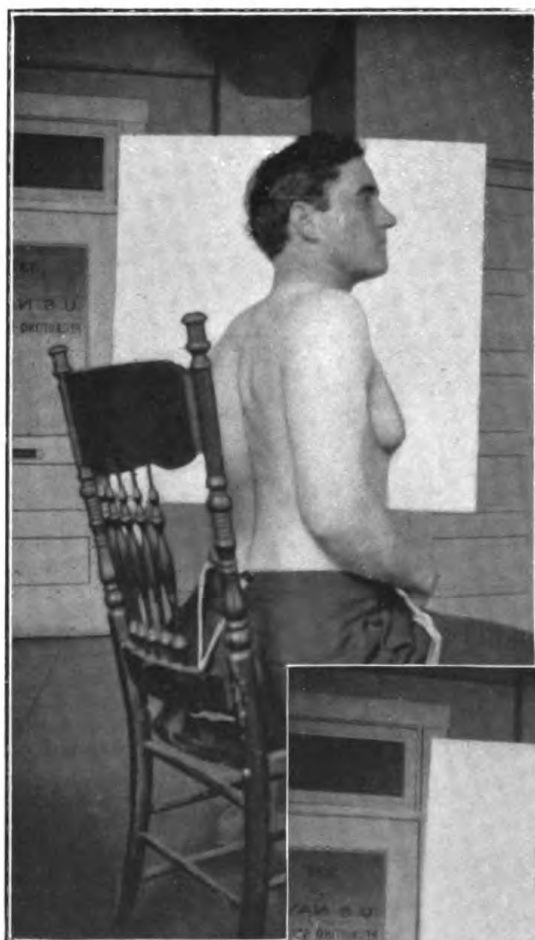
A REPORT OF TWO CASES OF DENTIGEROUS CYSTS.

By SURG. D. N. CARPENTER, U. S. Navy.

Recently while consulting several text-books on dentistry it was noted that the occurrence of dentigerous cysts is considered to be infrequent. This fact, therefore, is a sufficient excuse for publishing the following two cases which came under my observation during a recent tour of duty at the United States Naval Station, Cavite, P. I.

Case 1.—Filipino, age about 18, applied for relief from a tumor of the left side of the face, which he stated had been getting larger during the past six years, since he first noticed it. Examination showed a large, firm tumor, apparently springing from the parotid region and believed to be a sarcoma or osteochondroma of the parotid. Dentigerous cyst was considered, but after counting the teeth it was excluded, the count being apparently normal. A resection of the left half of the lower jaw was decided upon after consultation with several other naval surgeons, who agreed with the original diagnosis of sarcoma. The night before the operation I decided to make a second count of the betel-stained teeth of the patient, for the size of the growth had prevented opening the mouth sufficiently wide at the first examination. This time the left lower second bicuspid was found absent, and upon deep pressure over the growth on the inside of the mouth an indefinite cystic "spring" was obtained. The operation the following day was therefore, first, a deep exploratory incision along the left alveolar border of the lower jaw and immediately a milky cystic fluid was discharged. With the finger inserted through the incision the soft myxoid tissue was rapidly broken down and search made for the missing tooth. A smooth, tooth-like surface was found at the bottom of the cavity, and after considerable difficulty a long, curved hæmostat was successfully used to remove the tooth which was situated at the root of the first bicuspid with the crown pointing outward. The tooth, after removal, was found to be deformed, especially the roots, either from absorption (?) or from





lack of development, and one root was carious. The cystic growth was scooped out and a gauze packing inserted. At the end of two weeks the tumor was the same size, and a second operation was performed to remove the roof of bone which formed the external wall of the cyst. Under ether anaesthesia a long incision was made along the inferior border of the jaw from the mentum to the angle and all the tissues, including the periosteum, reflected to the malar prominence. Attempts to enter the bony wall by chisels and trephines met with no success, as the bone was like ivory and resisted the instruments. Finally a small Hay's saw was used to cut two incisions, meeting like the letter V, and at the apex of these incisions a small chisel was introduced to pry back and break off the projecting triangle of bone. This opening permitted Rongeur forceps to enter and the removal of this bone was quickly accomplished. It was curious to see the effect of the irritation of the misplaced tooth upon the cancellous tissue of the bone between the external and internal plates, producing a granulation tissue which had evidently become myxomatous, as shown by microscopic examination of the removed tissue. The deformity of the jaw internally could not be remedied, or that extending into the neck, because a sufficient support of bone to hold the remaining teeth on the alveolar border had to be left. The periosteum and tissues were sutured, leaving a small opening at the angle of the jaw for an iodoform drainage wick which filled the cavity. A second separate wick was introduced through the mouth incision, to permit as little infection of the external wound as possible. There was primary union by first intention of the external incision in a few days, after which a single drainage wick was inserted daily from the outside through the first incision, after copious irrigations with bichloride solution and peroxide. For about two months the dressings were continued and small necrosed fragments of bone discharged, hastened toward the last by injections of silver nitrate solution and iodoform powder insufflations. The final result is well shown in the accompanying photographs, the only visible scar being a tiny depression where the external wick protruded. The inside of the mouth showed only a small scar. Movement of the jaw was obtained nearly to normal.

Case 2.—Filipino; age about 25; poorly developed body, with face distorted by a deformity of the lower jaw. Numerous healed sinuses of the left side of the face and neck, which he stated had discharged for months, then had healed, and new ones had appeared. The jaws could hardly be separated; the development of the lower jaw was infantile. There was much pain over the left side of the face, and evidence of extensive necrosis of both jaws. An incision was made through the swelling on the inside of the mouth and the finger inserted. Particles of dead bone were felt on all sides and high up a smooth tooth-like structure was felt. After a little patience the long hæmostats were applied with the aid of the finger, and a deformed molar tooth extracted, much necrosed. With the curette and forceps all free pieces of dead bone were removed, including the complete shell of the coronoid process of the inferior maxilla. One of the largest discharging sinuses was dilated with the hæmostats and used for external drainage. A large gauze wick was inserted as in the first case and the daily dressings and irrigations continued. The result obtained was not that of the first case, but it was amazing to see how rapidly the cavity healed and the amount of improvement of the jaw which resulted, even though there was left much deformity of the face, due to the long continuance of the process and nature's vain efforts to remove the offending tooth.

The contrast of the two cases shows the importance of early diagnosis before extensive necrosis occurs, and both show the de-

formity which may result from the condition. That the first case was believed to be a malignant growth demanding a most radical operation indicates the importance in all such cases of tumors of the jaw to remember the possibility of its being a dentigerous cyst and to definitely exclude this cause before attempting a resection of the jaw. The necessity, also, of operating through an external incision to remove the wall of bone and also retain the periosteum to strengthen the jaw later, is well shown by the first case. The operation through the mouth had removed the tooth and cyst, but there was no relief of the deformity until the bony wall had been excised.

A CASE OF MAMMARY DEVELOPMENT IN THE MALE.

By Passed Asst. Surg. E. M. BROWN, U. S. Navy.

The accompanying photographs were taken of a recruit in the Los Angeles office. The right gland shows a surprising development, the nipple is larger than usual, and on palpation the well-developed ducts could be traced. It is not unusual to see the breast in the male as large, but palpation will only reveal adipose tissue, and the subject will be fat otherwise, while this man was in excellent physical condition, and only one breast shows this development.

OPERATIVE TREATMENT OF EPIDIDYMITIS.

By Passed Asst. Surg. W. S. PUGH, JR., U. S. Navy.

In the December number of the *Annals of Surgery* there appeared an article by Dr. Thomas R. Hagner, of Washington, D. C., on the operative treatment of epididymitis. This article, which was reviewed in the *April Bulletin*, volume 3, page 157, at once appealed to me as quite feasible and rational, and with the hope that it would be found to give relief to some of those unfortunate enough to suffer from this complication, I decided to select one or two severe and annoying cases and try this method.

In the following cases I have endeavored to follow as closely as possible the technique as elaborated by Hagner:

Case 1.—F. W. R., ordinary seaman, age 19 years, was admitted to the sick list July 1, 1909, with an attack of left sided epididymitis as a complication of a chronic gonorrhœa. Epididymis was greatly swollen and very painful.

Operation July 2, 1909. Anæsthesia: Ethyl chloride, followed by ether, anæsthesia being preceded one-half hour by morphia, gr. $\frac{1}{4}$, atropine, gr. $\frac{1}{60}$, each hypo. An incision 3 inches long was made in the long axis of scrotum, over the epididymis, and carried down through the tunica vaginalis. This incision thoroughly exposed the testicle and epididymis, the latter being greatly swollen and very tense. Within the tunica vaginalis considerable fluid was found and

evacuated, then with a sharp-pointed tenotome numerous punctures were made into the covering of the epididymis, and considerable purulent fluid exuded from each incision.

The tunica vaginalis was then closed with catgut and the skin with silkworm gut, except a small area at the lower end of wound, through which a small gauze drain was inserted; sterile dressings applied.

Patient made prompt recovery from anæsthesia, drain removed in three days, and at this time testicle and epididymis were found almost normal in size. All stitches were removed at the end of six days, at which time recovery was complete from epididymitis, but chronic urethral discharge still persists.

Case 2.—H. B. H., ordinary seaman, white, age 20½ years, was admitted to sick list July 15, 1909. Anæsthesia, chloroform, followed by ether, anæsthesia being preceded one-half hour by morphia, gr. ½, atropine, gr. ⅛, each hypo. Incision about 3 inches long made through scrotum in long axis and carried through the tunica vaginalis, and considerable serous fluid evacuated. The testicle and epididymis were brought out in the wound and epididymis was found greatly swollen and tense. Epididymis was then punctured in a great many places, and swelling could be seen to subside. Testicle and epididymis were then replaced, tunica vaginalis closed with catgut, and skin with the Van Schott clamps, except the small area at lower edge, where a small gauze drain was inserted, and sterile dressings then applied. Patient made good recovery from anæsthetic. Drain was removed at end of three days and wound found dry. In seven days wound clamps were removed and wound found to be healed by first intention. Convalescence was uneventful, temperature being 100 after operation, normal the next day, and remained normal. Epididymis has apparently regained its normal size and condition.

Résumé.—This method has the following main points to recommend it:

First. Prompt relief of pain and symptoms.

Second. Short convalescence.

Third. Rapid return to normal state of organ.

Fourth. It is evident that the functioning power of this part of the body will be much better than if it had been treated by palliative means alone.

TWO CASES FROM REPORT OF U. S. S. HANCOCK, 1908.

By Surg. PHILIP LEACH, U. S. Navy.

CASE 1—RETINAL HEMORRHAGE.

A yeoman, third class, of unhealthy appearance, complained of blurring of the vision. Examination revealed hemorrhage in retina and vitreous of each eye, the condition being most marked in the left one. There developed, in the exudate in the vitreous, vessels that could be readily seen with a plus 8 lens at the sight hole of the ophthalmoscope. The exudate in some places presented a bluish-gray mass striated with the red vessels. In other regions it was traversed by a fine reticular structure not unlike cobweb. The vision of the right eye, in which the objective symptoms were much less

marked than in its fellow, never was less than twenty-twentieths, but in the left eye it fell to four-twentieths. Under tonics and large doses of potassium iodide, with rest of the eyes for several months, the exudate diminished and the vision of the left eye improved to fourteen-twentieths, and the patient was able to use his eyes for all purposes. At this period he became involved in a fist fight and received a blow on the left eye that caused intraocular hemorrhage and extensive detachment of the retina, with consequent nearly total loss of vision of this eye. Patient was invalided from the service. Repeated examinations failed to reveal any evidence of syphilis or other cachexia and the patient persistently denied having ever had any venereal disease.

CASE 2—MYOCARDITIS WITH RUPTURE.

A chief yeoman, aged $57\frac{1}{2}$ years, in apparent good health, was found dead in bed the morning following a shooting expedition of two days' duration.

The autopsy revealed a rupture of the posterior wall of the left ventricle near the mitral orifice, in a necrotic area about $1\frac{1}{2}$ inches in diameter. Pericardium distended with blood clot. Heart enlarged. Other findings: Extensive old adhesions of cerebral meninges; old pleuritic adhesions; large calculi in gall bladder; a very friable spleen; kidneys enlarged and congested, with narrow cortex; and large deposition of fat about pericardium, heart, and other organs.

A CASE OF FRACTURE OF THE SKULL; OPERATION AND RECOVERY.

(Reported from the U. S. Naval Hospital, Canacao, P. I.)

By Surg. F. W. F. WIEBER, U. S. Navy.

T., K. H., ordinary seaman, age $21\frac{1}{2}$ years. While patient was on liberty at Bacoar, P. I., he was struck with a club over the left side of the head, in temporal region. According to hospital ticket patient was unconscious for one and a half hours. The patient now denies ever being unconscious. He subsequently walked into the yard dispensary, apparently drunk and unable to speak intelligibly. On the following morning he was unable to speak at all, but when roused was able to understand all that was said to him and then relapsed into stuporous condition. On admission to the hospital patient was stupid, but could be roused to understand about all that was said to him. There was marked ataxic aphasia, only a few sounds being uttered. There was considerable swelling on left side of head with a slight abrasion. A depression could be felt over left temporal and parietal bones. Patient obeyed orders slowly, pro-

truding his tongue, which deviated strongly to the left. There was right facial paralysis, paresis of right hand with loss of fine coordinate movements, tendon reflexes of both sides were exaggerated without clonus or Babinski. Blood pressure in left brachial 140 mm. Riva-Roci.

Operation.—U-shaped incision left temporal region over side of depression. The flap being turned back revealed a depressed fracture, 4 inches long by 1 inch wide, extending from external angular process of frontal bone over temporal and parietal bones. A small trephine opening made, jagged ends removed and depressed bones elevated, clots and considerable free bleeding present from branches of meningeal artery, therefore more bone was removed; in all about 1 square inch; bleeding vessels found and tied. Dura opened and pia found injected and oedematous, but no free blood or clots. Dura was closed, also external wound, leaving rubber tissue drain; two days later temperature was normal; blood pressure 120 mm., with aphasia still present. In four days patient could say a few words and write poorly; with normal temperature and blood pressure. At the end of eight days patient was out of bed, could answer questions slowly and repeat his own name; linguals being pronounced imperfectly; his facial paralysis was nearly gone, grips of hands about equal; his memory for names of persons and places deficient. At the present time improvement has been steady and speech is good except to test phrases which still show ataxia to "r" and labial sounds. The wound united by primary intention.

CARRON OIL IN THE TREATMENT OF OTITIS MEDIA SUPPURATIVA (ACUTA).

(Report of two cases from U. S. Naval Hospital, Port Royal, S. C.)

By Passed Asst. Surg. R. E. RIGGS, U. S. Navy.

On June 4, 1909, E. A. P., second lieutenant, U. S. Marine Corps, suddenly experienced severe pain in his right ear, following, and apparently due to, sea bathing. From the beginning the case was unusually severe, and by midnight of the second day the symptoms had become so grave that a general anæsthetic was given and the drum membrane covering the attic incised, this region being the seat of the disease.

Upon incision there was a free escape of serum, pus not yet having been formed. By the next day, however, suppuration was fully established, and notwithstanding hot boric acid irrigations, which were given untiringly every three hours, combined with topical appli-

cations of other accepted drugs and mechanical appliances, the amount of pus increased from day to day for fully two weeks.

By this time the patient had become decidedly deaf and much run down in health, and everything pointed to a condition of chronic otorrhœa.

Judging from the happy effect of carron oil in the control of many superficial suppurative conditions, it seemed at this point not unlikely that it would here serve a useful turn. Accordingly, a medium-sized canula was selected and bent at the proper angle, and, having been attached to an ordinary hypodermic syringe, carron oil was injected through this directly into the middle ear.

By the next day suppuration had practically ceased, and on the following day the patient's hearing was fully restored. So great was the relief in this latter respect that the patient suddenly exclaimed to a friend with whom he was conversing: "Why, I can hear!"

The patient rapidly regained his health after this, and up to the present time no further pus has formed.

There are some striking points about this case, especially when it is considered that in attic disease the drainage is poor at best; suppuration here is prone to become chronic; and life is always gravely endangered on account of the "proximity to the tegmen tympani and cranial cavity" of a virulent organism.

Private E. has had a chronic discharge of pus from his left middle ear for five years. The condition had been treated pretty regularly since his enlistment a year ago, but no benefit was derived. From time to time he has suffered a great deal of pain, and the hearing of the ear had become poor. During July he was admitted as a hospital patient, and a paracentesis performed in order to the more easily have access to the middle ear. Carron oil was injected directly (into the middle ear) for several days in succession, and although the improvement was not so amazingly rapid as in the first case reported, still it was marked, and the patient has been apparently entirely cured. There is no discharge for the first time in five years, the pain has ceased entirely, and the sense of hearing has become nearly, if not normally, acute.

So astonishingly prompt and entirely effective was the treatment of these cases by carron oil that it seems reasonable to hope for great results when it is used early in fresh cases.

A CASE OF FRACTURE OF SKULL AND GUNSHOT WOUND OF LUNG, WITH RECOVERY.

By Passed Asst. Surg. W. S. PUGH, JR., U. S. Navy.

The following case occurred as the result of a fight with the police of Santiago de Cuba on the morning of April 30, 1907, being one of many other interesting cases in this group.

I was called to the civil hospital at Santiago de Cuba at about 4 a. m., of April 30, 1907, and found H. L. L., a fireman, second class, who had been admitted about one-half hour before. I was informed that he had been brought to the hospital in a wagon, in a dazed condition, coughing up considerable blood, and was also suffering from a paralysis of right arm and leg, but that his condition had rapidly become worse.

Upon examination I found the man in a comatose condition, respiration stertorous, but with a pulse of 60 and very weak and compressible, with pupils both dilated.

Over the left parieto-occipital region extending downward and forward from close to the middle line I found a wound about 3 inches long which had apparently been made with a sharp instrument, and the blow was glancing, penetrating the skin in a slanting direction. The instrument I found later to be a machette, and the injury was typical of same. From this wound there was considerable bleeding, and further examination revealed a depressed fracture of skull extending somewhat beyond the limits of the skin wound.

Examination of chest revealed a gunshot wound of the right side, the ball entering in the anterior axillary line and between the fourth and fifth ribs. This wound showed no evidence of a burn. It was not probed, and as there was apparently but a slight effusion of blood internally I decided to simply apply sterile dressings and let it alone, which was done. There were apparently no further injuries. By the time my examination was completed, patient's condition appeared desperate; he was almost pulseless and was given strychnine, gr. $\frac{1}{10}$ by hypo., and having been prepared in the meantime, he was at once taken to the operating room and given a small amount of chloroform, anesthesia induced, and the following operation performed:

The original wound was enlarged about an inch and a half, the edge retracted, and the fracture exposed, considerable depression being evident. Several splinters of external table were removed. The pericranium of bone anterior to fracture having been retracted, two small grooves were made with a small gouge, and with a heavy elevator the depressed bone was lifted into place.

Upon replacing the bone the effect was almost instantaneous, patient's body began to move, pulse increased in volume and fre-

quency, and stertor of respiration disappeared. From this time on more anesthetic was needed. After the elevation of fracture, the edges of aponeurosis muscle were sutured with catgut, and skin closed with silkworm gut, a small drain of rubber tissue being inserted at lower edge of wound and sterile dressings applied. Patient recovered shortly from the anesthetic and complained only of a little headache, which gradually disappeared. Drain was removed in two days, all sutures at end of six days and the sutured part united by first intention. Gunshot wound healed without any difficulty. He was out of bed at end of a week, the recovery was complete, and patient has experienced no trouble from same since leaving the hospital in Santiago over two years ago.

I have purposely withheld the report on this case so that he might be watched for other symptoms later, and as until recently I have been able to keep track of him, no conditions have turned up to cause him any inconvenience.

TWO UNUSUAL APPENDIX CASES.

By Passed Asst. Surg. R. ROLLER RICHARDSON, U. S. Navy.

Case 1.—E. S., P. M. Patient was operated on at Washington, D. C., on December 23, 1908. Discharged cured. The scar stretched, was tender, and the seat of colicky pains disabling him from duty, so on June 16, 1909, he was transferred from the marine barracks to hospital for observation and operation, if necessary. Examination upon admission showed scar of former operation 4 inches long, 2 inches to right of, and parallel with median line, through rectus muscle. Scar was slightly stretched at about its center and was painful to the touch. Patient was kept under observation until the 24th, when, under general anæsthesia (ether), an incision was made through the old scar into the abdominal cavity. The gall bladder was found bound down and incorporated in the upper end of the scar. In attempting to dissect it loose, it was broken and its contents discharged. The scar tissue was cut out of the wall of the gall bladder and the rent in the same closed with fine catgut sutures. Scar of old operation was dissected out and wound in abdomen, closed with two rows of sutures. A deep row of chromicized catgut was used to unite the muscular tissues and a superficial row of silkworm gut sutures was used to unite the skin and subjacent tissues.

Recovery was uneventful, with the exception of a small biliary fistula at the junction of the upper two-thirds with the lower one-third of the wound, which healed in a short time with no untoward after effects. Patient was discharged cured on July 28. Has been

doing duty since that time with no recurrence of symptoms to date (September 1).

Case 2.—H. L., P. M. Patient was admitted to hospital on morning of July 14 with temperature of 101.2, pulse 102. He stated that he had felt badly the preceding afternoon, with pain in the belly and cramps. He went to the sick bay and was given a dose of salts, which made him vomit and caused his bowels to move several times during the night. The next morning the pain was much worse and he was sent to the hospital. Hospital ticket gave no information except the diagnosis. Examination upon admission showed abdomen on right side to be very tender and painful upon palpation, especially over McBurney's point, with rigidity of right rectus muscle and a tumor mass under McBurney's point. Face was flushed and he was slightly nauseated. Patient prepared for operation July 15. Under general anæsthesia (ether) and with the usual aseptic and antiseptic precautions, an incision was made through the abdominal wall at McBurney's point, over the tumor mass. Upon incising the peritoneum there was an escape of pus from an abscess cavity just beneath it. In this cavity the appendix was found with its distal end wrapped up in a mass of omentum. A short distance posterior to its tip there was a gangrenous area which had ruptured. The omentum surrounding the appendix was deeply congested and gangrenous in places. There was a localized peritonitis and the cæcum was so bound down by the adhesions forming the walls of the abscess cavity that it was with great difficulty sufficiently loosened up to permit the base of the appendix being reached. The appendix was amputated and the stump invaginated into the cæcum by a purse-string suture. The inflamed and gangrenous omentum (about 6 by 4 inches in size) was ligated and amputated. After this was done a small pus pocket was found above the original walled-off pocket inclosing the appendix. This was opened and drained. Abdomen was flushed out with normal salt solution. Wound was closed for two-thirds of its extent (peritoneum with fine catgut; muscles with chromicized catgut and skin with silk-worm gut sutures) and a drainage tube inserted in the open one-third; dressings and bandage applied over all and patient returned to bed in fairly good condition. Temperature dropped to normal on the 19th and discharge from the abdominal cavity ceased and sinus closed on 22d. Wound in abdominal wall did not close, but began to discharge freely, and patient began to run a septic temperature. On July 30 abscess in abdominal wall surrounding wound was curetted and wound closed with chromicized catgut sutures. Original wound healed nicely, but there developed several stitch abscesses, which took about two weeks longer to heal. Convalescence afterwards was uneventful.

PROCTOCLYSIS IN TYPHOID FEVER.

By Surg. C. F. STOKES, U. S. Navy.

F., musician, U. S. Marine Corps, was admitted to hospital with typhoid fever. His attack was moderately severe, attended with delirium, fever, and other characteristic symptoms. He refused water.

Proctoclysis was begun with the reservoir from 4 to 6 inches above the rectum, so that no danger from pressure could result. In this way the patient absorbed 1 pint of warm saline solution every three hours, making approximately 1 gallon in twenty-four hours. Elimination was promoted, there was an increase of urine, and the mental symptoms cleared up pronouncedly. The patient was in no way discomforted by the procedure.

CURRENT COMMENT.

[It is to be remembered that in the publication of these comments the bureau does not necessarily undertake to indorse the opinions expressed, but will lend the pages of this section to discussion of such contemporary topics as will be of interest and value to the service.]

SUBSCRIPTION PRICE OF THE BULLETIN.

Individuals to whom this publication may not be sent officially may obtain it upon mailing the cost price in currency or money order to the Superintendent of Documents, Government Printing Office, Washington, D. C.

Single numbers cost 25 cents domestic postage and 31 cents foreign postage prepaid.

Yearly subscriptions (beginning January 1) are \$1 domestic postage and \$1.25 foreign postage prepaid.

The bureau desires to call to the attention of such officers as may not have seen the circulars sent to each station the fact that reciprocal arrangements were accomplished last March with the New York Post Graduate Medical School and Hospital by which, in return for a course of lectures on sanitation and hygiene delivered by Medical Insp. H. G. Beyer, the privileges of the general courses of the school were extended without fee to officers of the naval medical service upon showing credentials from the bureau.

The attention of all medical officers and members of the Hospital Corps is invited to the last paragraph of the Preface. The continued life and increasing value of this periodical depend upon the cooperation of all who may be able to contribute special articles and reports of important or interesting cases; the latter are frequently so briefly outlined in the pages assigned for this purpose in the quarterly statistical report as to preclude direct publication. The demand for the Bulletin is becoming more widespread but dependence for contributions should be restricted to observers in the service whose number ought to be adequate for the purpose; it is desired that the

Bulletin be representative of the thought and observations of the whole corps.

Favorable comment already received indicates the material thus far offered to be of a high order and of great value to the service, and contributions have seldom been found unsuitable so far as the bureau is informed. This should lend encouragement to all to show appreciation by sustaining the success of a worthy effort.

Full reports are particularly desired whenever cases of heat stroke, cramps, or exhaustion are observed, in order that the navy may present its experience with this, as yet little understood, affection before the industrial and occupational section of the International Congress on Hygiene and Demography to be held in Washington in September, 1910. Reports are also looked for upon new arrangements for the care of wounded on board ship.

The discussions at the sixtieth annual meeting of the American Medical Association, at Atlantic City in June, relative to the forthcoming revision of the Pharmacopœia, give a fair idea of the more important questions which will occupy the attention of the committee on revision.

It was suggested that the next Pharmacopœia be limited in its scope to the consideration of single drugs and that compounds and mixtures be relegated to the National Formulary; that a short description of the therapeutic action of each drug be included in the text; that simpler names be substituted for the long chemical names; that the Pharmacopœia be revised every five years, etc. Aside from these, however, many other questions will arise, such as establishing physiological standards of such drugs as ergot, digitalis, strophanthus, etc., the introduction of new sera and synthetics, the elimination of many of the drugs now included, and the practical value of the present purity rubric.

Obviously the navy delegates should be representative of the opinion of the Medical Department, and the bureau would again request expression of opinion on any or all of the above questions as well as original ideas which may be of value at the convention.

The Journal of Tropical Medicine and Hygiene has undertaken to secure from its foreign subscribers information regarding clothing by inclosing within the pages of its issue of May 1 a blank clothing inquiry. They ask for the country, town, or district: If the climate is equable; if there is a "winter;" whether the climate is dry or moist; if there is a wet and a dry season; what material is used for

clothing by natives, laborers, and the well-to-do; what material is used by Europeans in hot weather for underclothing, coat, and trousers; if the underclothing is closely woven or open (cellular); what head covering is worn by natives and Europeans; in wet weather, what is the texture of the over (or rain) coat and of stockings; colors preferred for clothing, and general remarks.

Editorially it is remarked that no one has yet given a formula whereby a European setting out for the Tropics may procure appropriate clothing.

Uniformity of opinion seems to be decidedly lacking, and a well-digested summary of replies will be expectantly awaited.

Medical officers of the army and navy will wish success for a campaign of education undertaken by the California State Association for the Study and Prevention of Gonorrhea and Syphilis. In the *Pacific Medical Journal* for August there is outlined a formidable array of intentions to promote public discussion for the enlightenment of "every man and woman in this State" with regard to venereal disease and enactment of quarantine laws, which is a radical departure from the hitherto misguided tendency to treat the subject with as scant general recognition of existence and dangers as its manifest prevalence would permit.

In August there was issued from the press of P. Blakiston's Son & Co., *Naval Hygiene*, by Medical Insp. James D. Gatewood, U. S. Navy. This work promises to prove one of lasting value to the naval service for the reason that while every practical question of present importance in this branch of hygiene appears to be considered, the author's main effort seems to have been to furnish a logical exposition of the principles which should guide the naval sanitarian in solving future problems as they may be expected to arise in the general advance of naval construction and development.

In the first chapter is found, perhaps for the first time, a comprehensive analysis of the vital statistics of the United States Navy. While the statistical returns made to the bureau in any one year or group of years are susceptible of many deductions and doubtless varying interpretations, the bureau in its annual report through lack of adequate personnel of officers and clerical force has never been able to publish more than a brief study of the vast amount of data available; for such work more than mere office force is required—wide experience, good memory for the events and conditions of previous years, and withal a judicial mind are essential for evolving tenable

comparisons. This book evidently indicates the direction which the thought of serious-minded officers should pursue, and it is confidently hoped that a proper interest will be now awakened.

A novel feature is the attempt to reduce to common terms the damage resulting from loss of service in sick days, discharge by medical survey, and death from each disease or injury, groups of diseases and from one or more stations. While some observers may upon first thought be inclined to dispute the relative values attached to the more or less arbitrary formulæ given, the computation of the total damage should prove of inestimable service for purposes of comparison.

The study of air, light, food, and water supply ought to serve as a liberal sanitary education for officers of all corps, and the final chapter on recruiting may be expected to strengthen the already growing tendency upon the part of medical officers to realize that in the ultimate analysis "the health of a navy is primarily in the hands of the medical officer at the recruiting station."

This text-book may be obtained for all important ships or stations upon approved requisition.

THE WORK AT TAYTAY.

In the Bulletin of the Manila Medical Society (April, 1909, Vol. I, No. 1), which is its first issue, was published a resolution of the society adopted last October at its cholera meeting. The indorsements thereon of the governor-general and secretary of the interior have resulted in what should prove a highly interesting and important experiment, the productiveness of results of which should be assured by the cooperation of the bureau of science and the bureau of health. The society petitioned:

The work in question has for its purpose a medical survey of a typical Filipino town, as complete, comprehensive, and thorough as can be made. The work is being conducted during the months of March, April, and May by members of the faculty of the Philippine Medical School and of the staff of the bureau of science and by Dr. Paul Clements, of the bureau of health. An extension of duty was secured for Dr. H. J. Nichols, of the army research board, and he joined the expedition the last of March. Three recent graduates and four undergraduates of the medical school are assisting. Dr. R. P. Strong, as acting dean of the medical school and director of the biological laboratory, assists the work in an advisory and supervisory capacity.

A laboratory, clinic, and dispensary have been established on the ground, and have an average daily attendance of from 40 to 70. Routine physical examinations and microscopic examinations of feces, blood, urine, sputum, etc., are made in the local laboratory and clinic. Specimens for more elaborate bacteriological examination are sent to the laboratories of the bureau of science or the army division hospital. Surgical cases are sent to the free beds of the medical school at St. Paul's Hospital. Studies are being made of the water and food

supplies, of sanitary and hygienic conditions, and of any and all questions which suggest themselves as having a possible bearing on the health of the people. In this connection as careful a study as the demands of other work will allow is being made of the modes of disposing of excreta found in use by the people, and it is proposed that before the work is finished some practical experiments will be made in establishing model outhouses for this purpose and watching the comparative advantages of different styles of construction. In so far as it is possible to carry out this part of the work, the purposes of the proposed commission on the disposal of human excreta will be accomplished. While it is hoped some contribution toward solving the problems of disposing of human excreta in the islands will be made, the field of work which is being covered at Taytay is too broad and the amount of work involved is too great to give this subject anything like the thorough and comprehensive study which it demands and which was contemplated in the resolution asking for the appointment of a special commission.

Interest in this work is greatly increased by the outbreak of cholera, which is noted in Public Health Reports, June 4, 1909, Vol. XXIV, No. 23, in this very district; conditions thus would appear to be ideal for investigating the first cases, but as yet no light has been thrown upon the origin of the first case. An extensive examination is now being made for possible spirilli carriers, so far without success.

MEDICAL EXAMINATION OF ARMY RECRUITS.

By Surg. ALLEN E. PECK, U. S. Navy.

A brief outline of the system now being perfected for the examination of recruits by the medical officers of the United States Army may be of interest to those unacquainted with the progress made along this line in the last few years.

Physical examination has hardly been recognized as a field for specialization, except in insurance companies and certain of the large institutions of learning, but in the army it is fast becoming a part of medicine requiring special training and fitness.

It is not that their methods of examination differ much from those of the navy, but methods capable of greater thoroughness and care are employed and the facilities are much better.

At the various recruiting offices in different parts of the country no medical officers are stationed; the line officers in charge have received a short course of instruction (being sent for about two weeks to a recruit depot for this purpose), which enables them to make a physical examination and recognize the more obvious disqualifying defects.

At present there are five recruit depots: Fort Slocum, N. Y.; Columbus, Ohio; St. Louis, Mo.; Denver, Colo., and Angel Island, Cal., each having its defined tributary district, where the men

are sent after examination by the recruiting officers. At other army posts examinations are made in cases of reenlistment or where the expense of transportation to a recruit depot would be considerable.

Fort Slocum is the recruit depot for the Atlantic States. Here, from plans drawn by Major Shaw, a building has been erected, designed particularly for the purposes of recruit examinations. It contains also the dispensary and the offices of the dental surgeons. Each morning the men who have arrived the day before and have been kept in a barracks separate from the others are taken to this building, where they are first made to bathe. Each man is given a locker for his clothes and the key attached to his wrist; he is then stripped and passes into a large room, well lighted and ventilated and of even temperature. Here his measurements are taken and he is exercised and examined by two medical officers according to rules much the same as those given in our Book of Instructions. Defects easily overlooked in a small, noisy, or poorly lighted room are here quickly recognized. The examination is superior to ours, however, chiefly in the attention paid to organs of special sense. Adjoining this general examination room is a long, narrow room for testing the visual acuity and hearing. The test letters at one end are perfectly illuminated. The hearing is tested by voice and watch in this almost sound-proof room and accurately measured. If vision is twenty-thirtieths or less, the man is taken into a room suitably equipped and examined by ophthalmoscope and retinoscope. Still another room is used for the examination of nose, throat, and ear, which is made in all cases. In only a very small percentage are these organs found to be entirely normal. The officers conducting these examinations are given opportunity to qualify for this work by attending the Post-graduate Medical School in New York.

Recruits from Southern States are questioned, and if there is a history of hookworm disease a stool is obtained and examined. Also if there is obtained a history of typhoid a specimen is sent to the laboratory at Washington, and typhoid carriers are occasionally found. In such a case, or where for any reason it is deemed desirable to keep a man under observation a few days before enlisting him, e. g., when it is uncertain whether an alcoholic tremor is temporary or not, he is sent to the hospital and observed there or examined again in a few days.

Those who are accepted are sworn in by the medical officers and are then sent upstairs where finger prints are taken and a photograph in two positions, front and profile. After the men have been issued clothing, etc., their old clothes are disinfected, a large steam plant for this purpose being installed in the basement of the building. From 15 to 75 men are examined each day at Fort Slocum, about 12,000 for the last year. Of these about 15 per cent were rejected.

The apparent advantages of the army's method of recruiting are:

1. Fewer medical officers and no civilian physicians are needed for the work.
2. Greater skill is acquired by the comparatively few medical officers, who handle a very large number of recruits.
3. Identifying records are more complete and the detection of deserters more certainly and easily effected.
4. Malingering, either for entry into or discharge from the service, is rendered almost impossible.
5. The better conditions for examining make easier of detection such conditions as slight heart murmurs.
6. Epidemic disease is not brought into a post by the recruits, or is quickly detected and prevented from spreading.
7. The examination of organs of special sense prevents the enlistment of men with such conditions as chronic otitis media, ozæna, etc.
8. Being able to keep under observation for a few days doubtful cases is still another advantage.
9. Finally, the comparatively low degree of visual acuity required, twenty-fortieths in right eye and twenty one-hundredths in left,^a permits the enlistment of many men who would be rejected for the Navy and Marine Corps. In this connection Army Circular No. 5, of January 25, 1908, makes interesting reading. In it are given the results of experiments which seem to prove that the above standard of visual acuity is quite sufficient for accurate shooting.

NOTES ON THE TREATMENT OF SYPHILIS.

By Passed Asst. Surg. W. S. HORN, U. S. Navy.

It is a common fault in the treatment of this disease for the physician to follow the plan outlined in some one of the numerous works on syphilis, irrespective of how the dosage affects the patient. In other words, a relative method is adopted, which is applied to all cases. This seems to me not only irrational, but bad for the welfare of the patient. In the first place, the dosage of mercury, usually in the form of the proto-iodide, is too small. Such an eminent authority as Fournier states that the proto-iodide in doses of less than 10 centigrams a day is wrong in that it causes the outward symptoms to disappear, but does not protect against full tertiary and para-syphilitic manifestations. How many of us give such an amount regularly? In many patients a dose of this size gives us salivation symptoms. What is to be done? The form of the mercurial should be changed and given as the bichloride, not less than 3 centigrams

^a Enlisted men of the line of the Army, Engineer, and Signal Corps.

per day. In the form of bichloride mercury does not so quickly affect the mouth, gums, and teeth; in my opinion the use of the drug by the hypodermic method should be used only to start the treatment and in the emergencies when a rapid action is desired. In the treatment the dosage should not be prescribed and then the patient seen once a week, but until all evidence of the disease is gone the patient should be seen daily by the medical officer. In the treatment of the open lesions of the mouth a solution of nitrate of silver, gms. 2 to water 32 c. c., is the strength to use. In all cases with throat symptoms the fossæ of Rosenmueller should be examined carefully, as almost always some ulceration takes place there and is usually overlooked. A point in regard to the mucous patch: Often we see these so-called "patches" placed along the course of one of the nerves. When this is the case it is usually found that they are not mucous patches at all, but a form of herpes, and a few doses of arsenic heal them rapidly. Most forms of throat lesions are aggravated by the administration of mercury, which tends to congest the vocal and pharyngeal mucosa. It has been my experience that after a man has been on full doses of mercury for a month or six weeks, if the mercury is stopped and the lesions touched with silver nitrate, 6 per cent, they heal rapidly. During the first year the mouth and throat lesions tend to reappear at each period of mercurialization. When the pharyngeal ulcerations appear raised and succulent, potassium iodide in gram doses three times a day in addition to local treatment works wonders.

In my opinion a careful supervision of each case separately, with change in the form of the mercurial preparations, will let us take a case through the course of treatment without the embarrassment of having to stop on account of mercurial stomatitis.

The hygiene of the mouth and teeth is most important, and while the usual mouth wash of potassium chlorate, alum, or some of the astringents works well, I have found that, particularly in the case of smokers, a one-half of 1 per cent nitrate of silver solution is the most beneficial. It also possesses the great advantage of giving tobacco smoke a disagreeable taste and is an excellent help for the patient to abjure the use of the weed.

My treatment is to give the patient full doses of mercury, starting first with about twelve deep muscular injections of a soluble salt of mercury, to be followed by proto iodide. If local irritation in the mouth begins to manifest itself, a change to the bichloride will usually allow full dosage to be maintained. This mercurialization is kept up for a period of six weeks or two months, followed by a rest of two to four weeks, then another six weeks' period of mercury, followed by a rest of a month, then a month of potassium iodide, 1 gm. doses t. i. d., a month's rest, and then mixed treatment for two months. After the

first year the periods of treatment with mercury and iodide alternate and are reduced in frequency.

The muscular injections, while offering many advantages, are bound to present some dangerous features. Their great advantage is that known doses are given and a rapid action may be obtained. The condition in which treatment by the mouth shows that the drug is not absorbed, I think, obtains only when old pills are used, and I would advise against ready-made pills and would have the drug made up as needed.

A great deal is said about a patient getting tired and disgusted with mouth treatment: my experience has been that the sailor man of to-day wishes to get cured, and that he has enough sense to be willing to follow directions carefully, especially if seen by his medical officer daily, and thus realizes that the doctor is taking a personal interest in his case. The habit of taking his medicine can be acquired easily, and so long as it does not produce stomatitis the patient will take it regularly as a matter of routine.

In the special emergencies of early malignant tertiaries and eye complications the deep muscular injections of a soluble salt of mercury—the succinimide probably being the best—are demanded, and usually counteract the condition in a short time, when they may be stopped and regular internal medication resumed.

VIEWS ON TREATMENT OF TYPHOID FEVER.

By Passed Asst. Surg. HENRY A. MAY, U. S. Navy.

In the Bulletin for April, 1909, there are noted the observations of Surg. G. T. Smith relative to the use of the ice bag, and of the late Asst. Surg. C. G. Alderman as to his use of colon irrigations, in the treatment of typhoid fever. These items appeal strongly, because during the typhoid fever seasons of 1907 and 1908 at the Norfolk hospital both these elements of treatment, with certain modifications, entered into the routine.

During the latter months of 1907 there were treated some very severe cases, in which the infection seemed to be overwhelming, and hemorrhages to be looked for as a matter of course. It was here that the ice bag or ice coil was used, primarily as an adjunct in the treatment of the hemorrhage. At the same time it was noted in many cases where the external cold was applied that the patient became quieter, less anxious, and much more comfortable and cheerful; that his temperature dropped materially, and, so long as the coil was left on the abdomen, the daily variation in temperature was less marked. It was further noticed that in those cases in which diar-

rhea prevailed the discharges were much less numerous, while in those cases in which a tendency to constipation existed the bowels had to be artificially relieved by enemata, and thus the habit of colon irrigations became formed.

In 1908 the typhoid season opened about the middle of May, and from that time until the middle of August about 40 cases of true enteric fever were under treatment, all responding positively to the Widal reaction sooner or later.

From the day of admission until the temperature had been normal for seven days, nearly every one of these patients received from two to four high colon irrigations during every twenty-four hours, the temperature of the water ranging from tepid to ice cold, according to the requirements of the individual case. If the fever ran high, cold water was used, and the patient was encouraged to retain at least a part of it. If the patient complained of the cold water, as was sometimes the case, his wishes were complied with, and the most comfortable degree of heat or cold was employed. But it was noted over and over again, with but very few exceptions, that the irrigation was looked for by the patient as a welcome occurrence, and very frequently men asked for an extra irrigation because they realized its beneficial effects and the subsequent comfort and quietude of the nervous system.

Upon some patients the irrigations could not be used at all, because the insertion of the tube distressed them; and persistence in such cases does more harm than good, I am sure. This is on the same principle that some typhoids can take cold baths with good effect, while others can not. I have always felt that the arbitrary bathing of a typhoid patient whenever his temperature reached a given point, say 103° F., is an absurdity, and not based on sound logic. Different physicians set this mark at anywhere from 102 to 104, and hospital attendants, both civil and military, make much sport of the individual idiosyncracies of different doctors in this regard. We are taught, and our observation amplifies the teaching, that temperature of itself does no particular harm. It is an indication of the absorption of toxic products. But reducing the fever does not get rid of the poison, whose only means of escape is by elimination through bowels and kidneys. Therefore I contend that if a patient with a temperature of 104 or 105 shows no signs of nervous affection, or more than ordinary signs of discomfort, he is best let alone, so far as efforts to control temperatures are concerned. With the manifestation of symptoms directing attention, especially to the nervous system, reduction of temperature is of undoubted importance, although here, too, the toxic absorption is more of a fundamental factor than is the fever itself. But I do believe that we are not justified in ordering a temperature bath to be given repeatedly

even in these cases, just because the fever does not come down to our arbitrary figure and remain there. Every case must necessarily be a law unto itself, and every conscientious physician must seek that individual law and act upon it.

Given a profoundly nervous subject, wakeful, muttering, restless, with thick, dry tongue, tympanitic, wretched, desiring only to be let alone, why aggravate him with all the manipulations of rubber sheet and its accompaniments in the hands of an attendant who is tired and nervous himself, who is impatient with his charge, and who will probably not do justice to the case? Here it is that the ice coil and ice cap are invaluable, easily and properly applied (which is more than can be said of the average bath), and giving immediately beneficial results. And this, though somewhat of a digression, emphasizes what I started to say about the colon irrigations.

It has been recognized for years that colon irrigations give the best results in the treatment of the acute intestinal infections of children, and the pediatricist who does not embrace this idea in his "rule of faith and practice"—his creed—is the one who has least success in his cures. The marvelous results that come from using water instead of drugs in the so-called "summer diarrheas" of children are most patent to those who follow that custom. Why not apply the same thing to the summer diarrhea of adults—an infection not nearly so severe or deadly, in proportion to the resistance of the adult as compared with that of the infant? The same sequence of events takes place in both cases—less irritation from a clean colon than from one charged with mucus and feces, less absorption of toxic products, actual removal of infective germs and fermenting material by flushing, an opportunity to insert large quantities of water where it will be taken up by the circulation and aid in elimination by the kidneys, a tongue less dry and thick, a temperature which seldom ranges above 103° F. and is most frequently decidedly lower, case after case presenting no nervous irritation, and, withal, showing far less discomfort and distress than those treated by baths exclusively.

I wish to be understood as not decrying the temperature bath in its particular sphere, for, properly given, I believe it is an adjunct of great value. But boys with a few months' teaching and experience have not the skill or the patience to give temperature baths, nor will they ever be able to acquire that instinct for nursing, for "mothering," which a woman almost invariably possesses, and which goes so far toward aiding recovery from typhoid fever.

In the Norfolk hospital it was the custom to begin the treatment of every case admitted with the diagnosis of typhoid fever with a cleansing bath, an alcohol rub, a high enema of plain water, and a milk diet. No other treatment was instituted unless there were specific indications for it, such as hemorrhage, bad cardiac action,

excessive flatus, etc. Following the day of admission the patient received each morning a cleansing bath followed by an alcohol rub, and a high colon irrigation of from 1 to 2 quarts of normal salt solution at a temperature best suited to his individual needs. His diet was also that best suited to him personally, either milk and lime water, albumen water, raw eggs in milk, properly made broths, and at 3 o'clock each afternoon, all the ice cream he wanted—ice cream made at the hospital from pure milk and cream, and without any corn starch. I believe this luxury was a great boon to every patient, nourishing, eagerly looked for, thoroughly enjoyed, and in no instance harmful in the least. After 7 o'clock in the evening another colon irrigation was given, and another alcohol rub, and the patient usually slept well. In some cases to this was added at the proper time strychnine sulphate, gr. $\frac{1}{10}$, every three or four hours. Other cases had no stimulation at all. A few had more strychnine, some had alcohol in the shape of eggnogs at regular intervals; but each case was given no more stimulation than it needed, and we found that the majority of patients did well with much less than had been the custom in previous years. This, I believe, was due in large measure to the excess of fluid introduced into the system through the colon.

With the exception of a few cases, not more than half a dozen, flatus gave little serious trouble, and the introduction of the colon tube, or perhaps an irrigation containing turpentine, invariably gave relief, perhaps only temporary, but gradually increasing in efficacy as the disease progressed.

Hemorrhage is an accident which can not be foreseen or surely prevented, because it is due to engorgement of vessels and their erosion by the ulcerative process; but I do know that we had less hemorrhage in 1908 than in 1907. There were no perforations.

All that has been said above is from general recollection only, the records being beyond my reach. Other items of treatment and management were those usually met with, and all simply went to form the "experience" which everyone is always willing to get. But what I wish to do at this time is to indorse the articles of Smith and Alderman, so far as relates to the use of external cold and the copious use of water internally in preference to repeated bathings; for, from my own observation, I believe them to be much better suited to the conditions of the naval service than are the baths.

PROGRESS IN MEDICAL SCIENCES.

LABORATORY.

Passed Asst. Surg. O. J. MINK and Asst. Surg. E. W. BROWN, U. S. Navy.

BENEDICT'S METHOD FOR THE ESTIMATION OF GLUCOSE IN THE URINE.

Principle.—The reduced copper is thrown down as a white precipitate of cuprous sulphocyanate, $\text{Cu}(\text{CNS})$, in place of the yellowish-red separation of Cu_2O in Fehling's method.

Solutions.—

- | | |
|---------------------------------------|---------------|
| 1. Crystallized CuSO_4 | 69.3 gms. |
| Distilled water to..... | 1,000.0 c. c. |
| 2. Pure Rochelle salt..... | 346.0 gms. |
| Anhydrous sodium carbonate..... | 200.0 gms. |
| Distilled water to..... | 1,000.0 c. c. |
| 3. Potassium sulphocyanate..... | 200.0 gms. |
| Distilled water to..... | 1,000.0 c. c. |

The CuSO_4 solution is the same strength as used in Fehling's method. For use the three solutions are mixed in equal proportions; 30 c. c. of the resulting solution are equivalent to 0.073 gm. dextrose.

Technique.—The urine is first cleared with subacetate of lead (3 gms. being added to 50 c. c. of urine, thoroughly stirred and filtered; excess of lead is removed by adding to filtrate about 3 gms. of potassium oxalate, stirred and filtered). To 30 c. c. of equal parts of solutions 1, 2, and 3 in a small flask or beaker are added 2 or 3 gms. of anhydrous Na_2CO_3 and the mixture boiled until this is dissolved. The urine is now run in from a burette rather rapidly (not so quickly as to interfere markedly with continuous boiling) until a heavy chalky white precipitate is formed and the dark-blue color of the solution begins to lessen perceptibly, when the fluid from the burette is run in more slowly until the blue color just completely disappears. The last portion should be introduced in quantities of from 2 to 10 drops, with vigorous boiling of about one-fourth minute between each addition. The end point is sharp and satisfactory. A small piece of washed absorbent cotton will prevent bumping during the titration.

FORMULA FOR CALCULATION OF PERCENTAGE OF GLUCOSE.

$$\frac{7.3}{a} = b$$

a represents number of cubic centimeters of urine required; *b* the percentage of glucose in the urine.

Example.—If 9.3 c. c. of urine were required, $\frac{7.3}{9.3} = 0.705$ per cent of glucose.

ESTIMATION OF URIC ACID IN THE URINE, FOLIN-SCHAFFER.

Principle.—The uric acid of the urine is precipitated by ammonium sulphate in the presence of ammonia. The ammonium urate is filtered off, decomposed by sulphuric acid, and the liberated uric acid estimated by titration with KMnO_4 .

Solutions—

1. Ammonium sulphate, 500 gms.; uranic acetate, 5.5 gms.; acetic acid, 10 per cent. 60 c. c.; water, 650 c. c.
2. $\text{N}/20 \text{ KMnO}_4$, 1.575 gms. in 1,000 c. c.; 1 c. c. $\text{KMnO}_4 = 0.00575$ gm. uric acid.
3. Ten per cent ammonium sulphate.

Technique.—Take 100 c. c. of albumin-free urine, and add 25 c. c. of solution 1, using pipette. Stir well and allow to stand for five to ten minutes. This removes a mucoid-like substance from the urine which would interfere with the subsequent titration with KMnO_4 . After five to ten minutes filter through a dry filter into a dry beaker. Transfer 100 c. c. of the filtrate to a beaker, add about 5 c. c. of concentrated ammonia. Allow to stand until next day, when the precipitated ammonium urate is collected on a hardened filter. Wash the beaker containing traces of ammonium urate two or three times with a few cubic centimeters of a 10 per cent ammonium sulphate solution, passing the washings through the filter holding the ammonium urate. Now wash the filter two or three times with the ammonium sulphate. Remove the filter from the funnel, open it, and by means of hot water rinse the precipitate back into the beaker in which the urate was originally precipitated. The volume of the fluid should be about 100 c. c. After cooling, add 15 c. c. concentrated H_2SO_4 and titrate at once with $\text{N}/20 \text{ KMnO}_4$ until a faint pink color appears, which persists for one-half minute.

Calculation.—Each cubic centimeter of $\text{N}/20 \text{ KMnO}_4$ is equivalent to 0.00375 gm. uric acid. The 100 c. c. from which the ammonium urate was precipitated is equivalent to only four-fifths of 100 c. c.

of urine originally taken, therefore we take five-fourths of the burette reading in order to get the number of cubic centimeters of KMnO_4 required to titrate 100 c. c. of the original urine. Burette reading was 12.3 c. c.

$$12.3 \text{ c. c.} \times \frac{5}{4} = 15.375 \times 0.00375 = .0576 \text{ per cent.}$$

Add 0.003 to the result because of the slight solubility of ammonium urate in 100 c. c. of urine.

CLINICAL METHOD FOR THE ESTIMATION OF URIC ACID—MODIFICATION OF THE FOLIN-SCHAFFER PROCESS.

Solutions.—1. 500 gms. ammonium sulphate and 5 gms. uranium acetate are dissolved in 650 c. c. water; 60 c. c. of 10 per cent acetic acid are added and the whole made up to a liter.

2. 10 per cent solution ammonium sulphate.

3. N/50 solution of potassium permanganate. 1 c. c. = 1.50 mg. uric acid.

Principle.—Solution 1 is to remove phosphates and certain other bodies whose presence would in certain pathological cases disturb accuracy. When concentrated ammonia is added to the filtrate from these bodies the uric acid is precipitated in the form of ammonium urate.

Technique.—10 c. c. of filtered urine are placed in an ordinary centrifuge tube and exactly $2\frac{1}{2}$ c. c. of solution 1 are added. The mixture is now centrifuged and the clear supernatant fluid decanted. The time of this feature of the process should not exceed five minutes. 10 c. c. of the decanted fluid are then pipetted off into another centrifuge tube, 1 c. c. of concentrated ammonia added, and the mixture set aside until the following morning. The clear fluid is then decanted through a small hardened filter, the bulk of the crystals being allowed to remain behind in the centrifuge tube. The ammonium urate is now washed with three successive portions of the 10 per cent ammonium sulphate, of 3 to 5 c. c. each. Each portion is poured over the crystals in the tube, thoroughly stirred, allowed to settle, and then poured on the filter. This washing is to remove traces of adherent urine. The crystals on the filter are washed into a small 25 c. c. beaker, with as small a quantity of hot water as possible. A few cubic centimeters of hot water are placed in the centrifuge tube and 1 c. c. of concentrated sulphuric acid added, which quickly dissolves the urate. This fluid is transferred to the small beaker and rinsed out with as small a quantity of hot water as possible. The total volume should not exceed 15 c. c. It is now titrated hot with N/50 potassium permanganate.

Example.—The titration represents 8 c. c. of urine, owing to the above addition of solution 1; 8 c. c. of urine correspond to 3.4 c. c. N/50 KMnO_4 ; $3.4 \times 1.50 = 5.10$ mg. uric acid; 1 c. c. = 0.000637 gm., 100 c. c. = 0.0637, or 0.063 per cent.

TEST FOR BLOOD IN THE URINE.

Albarran and Heltz-Boyer. Presse Medicale, May 22, 1909.

Mayer's reagent.—

	Grams.
Phenolphthalein	2
Potassium hydroxide	20
Distilled water	100
Dissolve and add zinc powder	10

The mixture is boiled for 4 minutes, shaking the vessel. The fluid, red at first, rapidly loses its tint. As soon as decolorized, filter. This reagent will keep for months.

For the test add 1 c. c. of the reagent to 2 c. c. of urine and shake well. Then add 3 or 4 drops of ordinary hydrogen peroxide. If blood is present a red color appears, the intensity of which is proportional to the amount of blood. The reaction is not influenced by pus, albumin, pigments, sugar, uric acid or urates, acetone or indican, or by the ordinary drugs.

Comment.—In practical use at the school, the test as described above has proved very unsatisfactory. Urines which showed numerous red cells under the microscope failed to give the test. The test, however, was often positive if these urines were diluted with 10, 100, or 1,000 parts of distilled water. This would indicate an interfering substance which is more sensitive to dilution than the hæmoglobin.

The hæmoglobin was then extracted from the urine in the manner described by King (Nav. Med. Bulletin, Oct., 1908, p. 60).

Into a centrifuge tube containing 2 gms. of dried calcium phosphate pour 5 c. c. of the suspected urine. Mix well by stirring with a glass rod. The tube is then filled with alkaline alcohol and after thorough mixing centrifuged for a minute or so. The supernatant fluid is then poured off and the tube again filled with alkaline alcohol and treated as before. The supernatant fluid is again poured off and 5 c. c. of acid alcohol are added. This is thoroughly mixed by means of a glass rod and again centrifuged for a minute or so. The supernatant acid alcohol contains all the hæmoglobin, as hæmatin, which was present in the 5 c. c. of urine. A filter instead of the centrifuge may be used above, but is much slower. Two cubic centimeters of this acid alcohol is treated with 1 c. c. of Mayer's reagent and hydrogen peroxide as described above. We found that the test often appeared more readily when hydrogen peroxide diluted ten or fifteen times with water was used.—(O. J. M. and J. R. H.)

SOME NEW METHODS IN CLINICAL CHEMISTRY.

As stated in the last number of the Bulletin, this section will include changes in the methods of clinical chemistry which have been adopted at the Naval Medical School and may be added to or substituted for corresponding tests in the test-case manual.

TWO METHODS FOR THE ESTIMATION OF ALBUMIN IN THE URINE.

I.—TSUCHIYA MODIFICATION OF ESBACH'S PROCESS.

The technique is exactly as described by Esbach except that the following reagent is substituted:

Phosphotungstic acid.....	1.5 gm.
HCl (conc.).....	5.0 c. c.
Alcohol, 95 per cent q. s. ad.....	100.0 c. c.

This mixture should be kept away from the light. The claims for the following advantages of the method appear to be well founded: (1) With normal urine there is no precipitate, as is sometimes the case with the Esbach reagent. (2) The albumin settles more uniformly and foaming or floating of the precipitate is never seen. (3) The method is more exact at room temperature. (4) Small amounts of urine are precipitated as well as are larger amounts. This feature is especially important in the examination of febrile urines.

II.—THE SHORT METHOD OF ROBERTS-STOLNIKOW.

This requires more delicacy of manipulation than the Esbach method, but is readily carried out with a little experience. It has the marked advantage of giving results in a few minutes.

Principle.—The principle of the method is very old but has been strangely neglected by text-books of recent years. A sample of urine which contains 0.0033 per cent of albumin will show the Heller ring test in between two and three minutes. The sample of urine is diluted until the reaction occurs within these limits of time and the percentage of albumin in the original sample is calculated from the dilution.

Technique.—A cylinder measuring 100 c. c., graduated in tenths, and a bacteriological pipette are required. The table given at the end is convenient in showing the percentages of albumin in the urine, corresponding to fixed dilutions. It is convenient to remember that the urine, even in extreme cases, rarely reaches 1 per cent of albumin, and in the great majority of instances it is below 0.5 per cent.

The dilution is first made in column 1 and the ordinary Heller test applied. If the ring appears in less than two minutes a further

dilution of the first dilution is made as directed in the next lower line of column 2. If still too strong the *first* dilution is carried still further as in the next lower line of column 3. If first dilution showed the ring after three minutes, the next lower dilution in column 1 will be tried, and so on. The time is followed from the instant when the HNO_3 comes in contact with the urine and the ring looked for against a dark background. It is usually more convenient in making the Heller test to introduce the urine on top of the nitric acid. The horismoscope is a valuable aid in this method.

Example.—The urine is diluted from 3 c. c. to 90 c. c. as in No. 4 of column 1. The ring appears before the end of two minutes. Hence a dilution of 1 to 30 is too strong. 60 c. c. of this solution are further diluted to 90 c. c. Ring still appears before the end of two minutes. Dilution of 1 to 45 is too strong. 40 c. c. of the first dilution are now carried up to 90 c. c. The ring now shows in from two to three minutes. Dilution here is 1 to 67.5, which corresponds to 0.22 per cent of albumin in the original urine.—(E. W. B.)

Table of dilutions.

No.	1.		2.		3.		4.	
	Urine.	Water to make volume No. 1.	Mixture No. 1.	Water to make—	Mixture No. 1.	Water to make—	Dilution.	Albumin.
	c. c.	c. c.	c. c.	c. c.	c. c.	c. c.		Per cent.
1	1	1					0	0.003
2	30	90					3	.01
3	6	90	20	100			15	.05
4	3	90	50	100	10	100	30	.10
5	2	90	60	90	30	90	45	.15
6	1.4	94.5	60	90	10	90	67.5	.22
7	1.1	89.5	75	90	45	81.4	81.4	.27
8	.9	87.5	75	90	50	72	97.2	.32
9	.6	70	75	90	60	85	110.6	.39
10	.6	87	64	80	48	72	145	.49
11	.5	91.1	64	30	50	62.5	102.2	.60
12	.4	87.5	75	90	60	90	213.7	.73
13	.4	97.2	72	30	60	80	243	.81
14	.3	81	72	80	60	74.1	270	.90
15	.3	90	72	80	60	73.1	300	1.00

CHEMISTRY AND PHARMACY.

Pharmacist PAUL J. WALDNER and Hosp. Steward CHARLES SCHIAFFER, U. S. Navy.

GABROD, ARCHIBALD E. The excretion in urine of sugars other than glucose. Quarterly Journal of Medicine, Vol. II, No. 8, July, 1909.

The author reviews the work which has been done in recent years looking to the differentiation of the sugars found in urine, either individually or associated with glucose, which give rise to a condition which may be generalized as mellituria; and discusses the significance which attaches to their presence.

Regarding *lactosuria*, the writer states:

The presence in urine of a sugar which is dextro-rotatory, does not ferment with yeast within twenty-four hours, and does not yield a crystalline ozazone with phenylhydrazine, will suggest that the case is one of lactosuria, provided always that the conditions are present with which this variety of mellituria is associated.

Chief among these is the lactosuria of nursing women and that occasionally found during the end of the period of pregnancy. Lactosuria of infants, which is stated as having an entirely different origin, being associated usually with digestive disturbances, is not uncommon. Julius Grosz is cited as ascribing this variety in part to lowering of the assimilative limit and in part to the influence of the bacteria of the alimentary canal upon the splitting of the lactose therein, that portion which escapes inversion being absorbed and excreted as such.

Maltosuria.—It is said that maltose, in view of the difficulty of its detection when associated with glucose, is probably often a constituent of diabetic urine. It has a stronger dextro-rotatory power than glucose and its reducing power is less. This property serves as a means of its detection. When boiled with dilute acids the disaccharid is hydrolyzed and changed to glucose, with the result that the urine which contains it becomes less optically active, but gains in reducing power. Various authorities state that this sugar is associated with fatty stools and in pancreatic disease.

Lævulosuria.—When present alone or in association with other sugars the polarimeter is naturally of great value in the determination of lævulose. It may be, however, that the optical effects of the glucose and lævulose may balance each other and optical inactivity result, in which case it must be borne in mind that the lævo-rotatory power of the latter is twice as great as the dextro-rotatory power of the former. The author sums up the work on this sugar by saying that in order that the presence of lævulose may be satisfactorily demonstrated it is necessary to show that a lævo-rotatory substance is present which yields the reduction test of sugars, is fermented by yeast, gives Seliwanoff's reaction, and yields with phenyl-hydrazine the ordinary glucosozone, and with methyl-phenyl-hydrazine an osazone which melts after purification at 153° C.

Of its clinical aspect the author says:

As in the case of glucose, the assimilative limit for lævulose may be conspicuously lowered by disease, but the morbid states which favor the occurrence of alimentary lævulosuria are not the same as those which lower the limit for glucose; and the researches of H. Strauss and others have revealed a conspicuous influence of hepatic derangements upon lævulose tolerance. Indeed, it appears to be proven that the production of lævulosuria by comparatively small doses of this sugar serves as a definite indication that the liver is the seat of disease.

Pentosuria.—This sugar is rarely found in urine, and Bial's modification of the orcin test is regarded as the best means of determining its presence, although the reservation is made that it is unsafe to rely upon any single test for the purpose. Clinically it is of great importance that the occurrence of pentose should be recognized in distinction from other sugars.

Heptosuria.—One case has been reported in which urine reduced Fehling's solution freely; the polarimeter showed an optically inactive sugar; no fermentation with yeast except when glucose was also present. Tests for lævulose and pentose were negative, and an osazone was obtained which became brown at 190° and melted at 195° C. Further analysis confirmed the belief that a heptose was present.—(P. J. W.)

SHARP, J. GORDON, M. D. **Experiments and experiences, pharmacological and clinical, with digitalis, squill, and strophanthus.** Proc. Royal Soc. Med., Vol. II, No. 8, June, 1909.

These drugs are discussed and compared as regards their action on the heart, and the need for universal physiological standardization of such drugs, if we are ever to get away from the empirical employment of these valuable remedies, is conclusively shown.

Experiments on frogs with the tincture of digitalis made from leaves of varying ages and degrees of dryness brought out one particularly interesting fact; it was shown that the great essential is to employ leaves which have been kept free of moisture, thereby preventing decomposition of the glucosides by the ferment present. Likewise tinctures of various ages made with leaves of assured quality were used experimentally, and it was shown that the safe age limit of a tincture is about twelve months. Numerous commercial samples of the tincture gave absolutely negative results on the frog.

The work with squill indicates that this drug acts on all the anatomical parts of the heart, increasing the work of the heart muscle.

In the case of strophanthus, Sharp found that a slight modification of the official test for strophanthin in the seeds gives much more satisfactory results. He suggests "whisking" the dish containing the cut seeds and sulphuric acid through an alcohol flame, thereby obtaining a concentration of the mixture, which will give the green color if the seeds are of the true species.

Clinically he believes that this drug does not bear out its reputation as a heart tonic which the experiments on the frog's heart or the excised mammalian heart would attribute to it. Summing up, it is the author's belief that digitalis is the only real heart tonic, and where it fails nothing else will succeed. He further states that the general belief that digitalis does not act for thirty-six to forty-eight

hours is based upon the fact that the small doses in which it is usually given are excreted almost as fast as ingested, but that in more appreciable, or practically maximum, doses almost immediate effects are obtained. The tincture is said to be the very best preparation, and the glucosides are not considered superior, if as good.—(P. J. W.)

BENEDICT, STANLEY R. **A reagent for the detection of reducing sugars.** *Journal of Biological Chemistry*, February, 1909.

The author recommends the replacing the Rochelle salts in Fehling's solution by sodium citrate.

Copper sulphate	17.3 gms.
Sodium citrate	173.0 gms.
Sodium carbonate (anhydrous)	100.0 gms.
Distilled water, to	1,000.0 c. c.

With the aid of heat dissolve the citrate and carbonate in 600 c. c. of water. Pour (through a folded filter if necessary) into a graduate and make up to 850 c. c. Dissolve the copper sulphate in about 100 c. c. of water and make up to 150 c. c. Pour the carbonate-citrate solution into a large beaker and add the copper sulphate solution slowly, with constant stirring. The mixture is ready for use. To 5 c. c. of reagent add about 8 drops of urine. Heat to boiling for about two minutes and allow to cool spontaneously. In the presence of dextrose the entire body of the solution will be filled with a precipitate which may be red, yellow, or green. If the amount of dextrose is small, the precipitate forms only on cooling. If no dextrose is present, the solution remains absolutely clear or a very faint turbidity, due to precipitated urates may be apparent. The reaction is given by 0.08 per cent of dextrose.

The reagent does not undergo spontaneous reduction. Specimens have been kept for a year without change and were not altered after heating on the water bath for twenty-four hours.—*Passed Asst. Surg. O. J. Mink.*

TAYLOR, ALONZO ENGELBERT. **On the antagonism of alcohol to carbolic acid.** *Journal of Biological Chemistry*, December 8, 1908.

His results were entirely negative to the idea of a chemical detoxication of carbolic acid by alcohol. With yeast cultures the anti-fermentative action of carbolic acid was in no wise retarded or inhibited by the presence of 10 per cent of alcohol. The presence of soluble sulphates reduced appreciably the toxicity of phenol, but alcohol in no concentration had any such effect. Therefore the effect observed in therapeutic practice must rest upon a physical rather than a chemical basis.—*Passed Asst. Surg. O. J. Mink.*

REPRINTS FROM CHEMICAL ABSTRACTS. American Chemical Society, vol. 3, No. 15, August 10, 1909.

The antitoxic activity of iodine in tuberculosis.—A. Cantani. II. med. Klin. Univ. Naples. Z. Hyg., 63: 34–67 (30 references, 22 Italian).—1. Solutions 1: 500 to 1: 1,000 have an antiseptic action upon tubercle bacilli, also a weakening, and finally an antitoxic action upon tuberculin 0. The complete inhibition of the fever reaction was often evident. Cultures detoxicated by 1 had no toxic effect upon tuberculous patients or animals, and tuberculins that did not give a fever reaction could be prepared. Patients could be immunized to tuberculin 0 by treatment with tuberculin 0 and 1 for comparatively short periods. The nature of the action of 1 is probably very complex, but is undoubtedly a direct action upon the tuberculin, either antitoxic, i. e., neutralizing, or simply a weakening effect. A number of lines for investigation are suggested.—II. A. Mattill.

New experiments on the physiological action of sulphuric ether.—J. Derouaux. Lab. clin. médicale, Univ. Liège. Arch. intern. pharmacodyn., 19: 63–95.—Pure ether, when injected subcutaneously into a normal dog, can cause a rise in the arterial pressure, which may be accompanied by an acceleration of the pulse rate. When administered intravenously there is a fall in arterial pressure at first, which is soon followed by a rise; the fall in pressure is accompanied by a diminution of the amplitude of the pulsations and sometimes by a lessening of the rate, the latter being a result of the reflex stimulation of the vagus; the rise in pressure is occasionally accompanied by an acceleration of the rate of heart beat. On the isolated heart, ether exerts a depressive action which is manifested in a diminution of the amplitude and the rate of pulsation and in irregularities in the rhythm and it is this depressive action which is considered the cause of the fall in pressure at the beginning of intravenous injection of ether. The rise in pressure, however, is due to a vaso-constriction. Injection of ether into the carotid provokes a notable rise in pressure, not preceded by a fall or by a showing of the heart rate; it is accompanied by a more vigorous and more frequent cardiac contraction, and by vaso-constriction. Ether exerts no action after section of the cord in the dog.—Israel S. Kleiner.

Contribution to the physiology of the glands.—L. Asher. Further contributions on the function of the spleen as an organ of iron metabolism.—R. Zimmermann. Bern. Biochem. Z., 17: 297–336.—Spleenless dogs excrete more Fe. even eleven months after removal of the spleen, than normal dogs. Subcutaneous injection of Fe increases slightly the rate of excretion in both spleenless and normal dogs, the difference between them being practically unchanged. The spleen appears therefore to be of little influence in the handling of artificially injected Fe. Haemolysis caused by acetylphenylhydrazine increases the Fe excretion in both sets of animals. The increase is somewhat greater in the spleenless dogs, which indicates that the spleen functions in the elimination of Fe freed by haemolysis, although the smallness of the difference indicates that the function is not a very active one. Destruction of body protein caused by protein starvation results in a marked increase in the Fe excretion of both normal and spleenless dogs. This indicates that Fe is liberated by destruction of the tissues. The excretion was much more increased from the spleenless than from the normal dog. This supports the assumption of Asher, that the spleen assists in the elimination of Fe liberated by broken-down body tissues, except possibly blood corpuscles.—D. D. Van Slyke.

Modifications in the chemical composition of the blood serum in victims of carbon dioxide poisoning.—G. Patein. J. pharm. chim., 29 [6]: 417–22.—Three cases were studied. Compared with the normal the pathological serum presents

the following differences: It is more or less rose-colored. The proportion of serin is augmented while the globulin is diminished. After neutralization and separation of the acetoglobulin one of the three sera did not contain any matter coagulable below 75° whereas a normal serum furnishes an abundant coagulum at 64°. Methods of analysis are given in detail.—*L. E. Warren.*

PATHOLOGY AND BACTERIOLOGY.

Surg. C. S. BUTLER and Passed Asst. Surg. O. J. MINK, U. S. Navy.

Dr. H. DUUSCHMANN. *Etudes sur la fièvre typhoïde.* Annales de l'Institut Pasteur, January 25, 1909.

The author reviews the literature on typhoid carriers very carefully. He records observation on 101 persons who had had typhoid and finds 4 per cent of carriers, who had the disease from five to twenty years previously. In routine examination of prisoners carriers were found who gave no history of the disease. Para-typhoid carriers were also found.

He concludes that to the carriers are due:

1. Sporadic cases.
2. The persistence of the so-called typhoid houses.
3. Epidemics and endemics of typhoid.

He next considers the location of the bacilli in the carriers. Carriers excrete the bacilli, not regularly, but only at times, and then often almost in pure culture. Women are carriers about three or four times as often as men, which is the proportion of cholelithiasis among the two sexes.

In the disease the bacilli, early present in the blood, localize first in the gall bladder and from here pass into the intestine. They disappear from the blood early, but tend to flourish in the gall bladder indefinitely, and from here are ejected periodically in the duodenum and appear in the feces of the carrier.

With regard to prophylaxis it is important to distinguish two varieties of carriers:

1. Those who excrete bacilli for some weeks during convalescence.
2. Those who, after an apparent cure, excrete the bacilli for an indefinite time.

As a result of his observations the author uses for the isolation of the bacillus the following media: Agar, 3 to 4 per cent; gelatine, $\frac{1}{2}$ per cent; taurocholate of Na., 1.5 to 2.5 per cent; lactose, 4 per cent; peptone, 5 per cent, salts.

These ingredients are incorporated in the extract from 500 grams of beef in 1,000 c. c. of water.

To each plate before pouring is added 10 per cent of the tincture of tournesol.—(O. J. M.)

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WHIPPLE and SPERRY. **Chloroform poisoning, liver necrosis and repair.** Johns Hopkins Hospital Bulletin, September, 1909.

The general summary of the work is:

1. Chloroform is a poison and when given to produce anæsthesia will cause more or less damage to the liver. This is true for man and animals.
2. Chloroform anæsthesia for a period of one to two hours invariably causes some central liver necrosis and may cause a fatal result in dogs.
3. Animals vary widely in their susceptibility to this drug. Young animals as a rule are more susceptible than adults.
4. Chloroform anæsthesia for thirty-five minutes may cause fatal poisoning in man with almost complete liver necrosis.
5. The pathology of chloroform poisoning is identical in dogs and in man.
6. The essential change is an extensive necrosis and fatty degeneration of the liver. There may be numerous ecchymoses and hemorrhages into the peritoneum or upper intestinal tract. The pancreas may show many fat necroses and ecchymoses. The kidney and heart may present a moderate degree of fatty degeneration.
7. Pregnancy is no protection against the poisonous action of chloroform anæsthesia. Chloroform narcosis in pregnancy may cause extreme liver necrosis, and placental necrosis with separation and hemorrhage. The fetuses may show no liver necrosis.
8. Central necrosis due to chloroform is uninfluenced by the blood supply of the lobule. This necrosis is the same whether the hepatic artery is ligated or the portal blood is excluded by means of an Eck fistula.
9. Ligation of the hepatic artery causes no change in the normal dog.
10. An Eck fistula produces a diffuse atrophy and a little fatty degeneration, affecting principally the centers of the liver lobules.
11. Chloroform injected into the portal vein will cause scattered necroses, many of which are peripheral.
12. Chloroform injected into the hepatic artery will cause necroses of the same type, both peripheral and central, the latter predominating.
13. The liver necrosis becomes visible to the microscope only after six to ten hours. The explanation for this is not clear.
14. If an animal recovers from the chloroform poisoning, the repair takes place rapidly and brings the liver back to normal in two or three weeks.
15. Repair is effected by solution of the necrotic liver cells and rapid multiplication of the remaining peripheral cells.
16. Repair goes on normally in a liver which is shut off from the arterial stream.
17. Cirrhosis does not follow extensive central necrosis and repair.—(O. J. M.)

LIBMAN and CELLER. **The importance of blood cultures in the study of infections of otitic origin.** Am. Jour. of Med. Science, September, 1909.

1. Significance of positive results:

(a) A positive blood culture is of value when there is doubt as to the existence of a sinus thrombosis after a patient has been operated upon for mastoid disease.

(b) In certain cases, after the sinus has been explored and a clot has been removed and the jugular vein has not been ligated, the persistence of streptococci in the blood has given the indication to tie the jugular vein, and, as

we have previously stated, in almost all of the cases the bacteria have promptly disappeared from the blood.

(c) The most valuable field for the blood-culture studies has been in the border-line cases, in which it has been very difficult to come to a definite conclusion without the use of the cultures.

2. Significance of negative blood cultures:

(a) We have shown that negative results can be obtained, even though not frequently, in cases in which a sinus thrombosis is present. The absence of bacteria in a doubtful case would make one hesitate in exploring for a thrombus until the possibility of all intercurrent disease had been excluded, or until the symptoms had become so severe as to justify an exploratory procedure.

(b) If the blood culture should be negative and the symptoms should persist in a given case, whether there is a sinus thrombosis or not, acute endocarditis can be excluded.

(c) If there has been a sinus thrombosis and bacteria have been present in the blood, and the jugular vein has been tied, a negative culture is of value in showing that the general invasion has been stopped.

(d) Occasionally a negative culture has been of value in cases with a clinical picture of rheumatism. It is very valuable in such cases to know that we are not dealing with an arthritis due to a general invasion by the ordinary bacteria.—(O. J. M.)

SCHIERESCHEWSKY. The cultivation of the *Spirochæta pallidum*. Deut. Med. Woch., 1909.

The culture medium was horse serum rendered jellylike by heating to 60°. The luetic tissue was allowed to sink to the bottom of a tube of this medium and the tube was then tightly corked. In three to five days large numbers of the organism were found in the medium. The author also believes that he has successfully transferred the culture.—(O. J. M.)

CLEGG, M. T. Cultivation of the *Bacillus lepræ*. Phil. Jour. of Science, April, 1909.

On a special medium the author has succeeded in growing the lepra bacillus from leprous spleen in symbiosis with the amœba of dysentery. The bacillus grew rapidly as a short, plump, acid-fast bacillus and was transferred a number of times. Controls made under the same conditions, but omitting the spleen pulp, showed no acid-fast organisms.—(O. J. M.)

WELLS, GIDEON. The chemistry of the liver in chloroform necrosis (delayed chloroform poisoning). Journal of Biological Chemistry, October, 1908.

He summarizes his work as follows:

In the necrosis of the liver which occasionally follows chloroform anæsthesia there is a rapid autolysis of the liver cells resulting in a loss of as much as one-third or more of the solids in three or four days, and indicated chemically by the presence of free amino-acids, purins, proteoses, peptones, and poly-

peptids in the liver. Several of the amino-acids are present in quantities large enough to permit of their isolation and identification. Despite the loss of nearly all the nuclear structures of the liver, the amount of insoluble phosphorus was found in the specimen examined to be increased, without alteration in the amount of insoluble sulphur. The distribution of the nitrogen as mono- and diamino-acids in the insoluble coagulated liver proteins is not different from that of the proteins of the normal liver. There is a moderate degree of fatty metamorphosis, the microscopic and chemical findings corresponding in this respect; this increase in either extractive material being due to infiltration of simple fats, while there is a slight increase of lecithin and no alteration in the amount of cholestrin. There is less replacement of proteins by water and more fatty infiltration than in acute yellow atrophy.—(O. J. M.)

ARNHEIM. The present status of the whooping-cough question. Berl. Klin. Wochenschr.

Three organisms of whooping cough are described: (1) The bacillus of Czaplewski and Hensel, (2) the influenza-like bacillus of Jochman and Krause, and (3) the bacterium of Bordet and Gengou. The first is excluded by the failure of agglutination, and further study strengthens the belief that the organism of Bordet and Gengou is the true cause. Pure cultures are obtained by the use of weak acid media to which is added fresh, uncoagulated human or animal blood. The colonies are invisible, but by transfer from the apparently colony-free parts of the plates, visible colonies gradually appear in succeeding generations. The titer of agglutination is very high (1-5,000 to 1-10,000). The injection of the organism into the blood stream caused a marked and persistent lymphocytosis.—(O. J. M.)

MACEWEN, HUGH L. The conveyance of whooping cough from man to animals by direct experiment. British Med. Journal, January, 1908.

A cat was fed with milk mixed with the sputum and vomitus of whooping-cough patients. About one month after the experiment began, the cat developed typical whooping cough with vomiting.—(O. J. M.)

MATSON, RALPH C. Serology of syphilis. Medical Record, August 28, 1909.

The author by means of several excellent diagrams explains the action of antigen-amboceptor and complement. He concludes as follows:

1. The rarity of a positive reaction in normal serum and the high percentage of positive reactions in syphilis or suspected cases shows the test to be of value.
2. A positive reaction indicates that active syphilis exists although the present pathological condition may not be due to syphilis.

3. A negative reaction in a known syphilitic does not absolutely mean a cure, but possibly only a quiescence of the disease.

4. A negative reaction in an early suspected case is 95-100 per cent against syphilis; in a suspected secondary case, 90-100 per cent; and in a suspected tertiary case, 75-95 per cent against syphilis. In a suspected parasymphilitic the chances are 70-80 per cent against the existence of syphilis if a negative reaction is obtained.—(O. J. M.)

MEDICAL ZOOLOGY.

Surg. R. C. HOLCOMB, U. S. Navy.

SILVA, PIRAJA DA. *La Schistosomose a Bahia.*^a Archives de Parasitology, tome XIII, p. 281, 1908.

SILVA, P. DA. Contribution to the study of Schistosomiasis in Bahia, Brazil. Journal of Tropical Medicine and Hygiene, June 1, 1909.

Doctor Silva in these two papers produces important proof of the existence of a distinct species in the *Schistosomum mansoni*. The author reports 20 cases of schistosomiasis, in all of whom were found the egg with the lateral spine. In all the urinary examination was made, but no ova were revealed. In his paper he gives a description of the male, female, egg, and miracidium. The male he notes to be 12 mm. in length, 0.448 mm. in breadth in the middle part, 0.224 mm. at the anterior end, and 0.056 mm. at the posterior end. The parasite was tuberculated and had six masses representing the sexual organs posterior to oral sucker. His measurements were of parasites preserved in an aqueous solution of formic aldehyde. The female worms were from 14½ to 15 mm. in length, 0.168 mm. in breadth in the middle part, 0.056 mm. in the cephalic end, and 0.084 mm. at the posterior end. With reference to the sexual organs Silva says:

Examining the female, I found that there seemed to be some difference in the sexual organs; the oviduct originates at the posterior end of the ovarium, but instead of turning forward, parallel to the vitelline ducts, in order to form by meeting one another the common canal, named oötype, the oviduct enters immediately in the vitelline ducts, after a short slight turn.

In these specimens of the female studied by him he found not only females in copulation with males, but females with the lateral-spined egg in the uterus.—(R. C. H.)

DONOVAN, Maj. C., I. M. S. Notes on malaria and kala-azar. Journal of Tropical Medicine and Hygiene, July 1, 1909, p. 198.

Major Donovan speaks of a case of blackwater fever encountered in a European who had resided three and a half months in the Godavari district, and whose blood on examination showed very

^aThe photographic reproductions to accompany this review were received too late for plates in this issue, but will appear in the January number of the Bulletin.

small schizonts of *Laverania*, but of a species not *malariae*. The parasites found in the blood were of a peculiar shape, and according to Donovan a separate species to *Laverania malariae*, *præcox*, and *immaculata*, and he suggests that this severe form of paludal fever is due to a distinct species of *Laverania*.

With reference to the parasite of kala-azar and just what position it should take in the order *Protozoa*, Donovan refers it to the class *Mastigophora*, or that of *Flagellates*, and more especially to the genus *Herpetomonas*. Donovan writes:

There appears to be still a considerable amount of confusion, one may say ignorance, of the three parasitic genera, *Herpetomonas*, *Crithidia*, and *Trypanosoma*; all forms not in possession of an undulatory membrane and a posteriorly placed blepharoplast are loosely called "herpetomonas" forms or "wild trypanosomes" (sic). As I have had under observation during the last eighteen months a number of these three genera, I may be pardoned for my presumption in setting this question on a sounder basis. The full-grown form of the genus *Herpetomonas* is characterized by a blepharoplast placed almost at the extreme anterior end and with no signs of an undulatory membrane. The largest forms are found in this genus; for instance, *H. muscæ-domesticæ* measures 70 to 120 μ , including the flagellum. This genus occurs in the nonbiting flies and plant-frequenting bugs. In *Crithidia* the blepharoplast is located near and anterior to the nucleus; there is also present what may be called the rudimentary undulatory membrane. The parasites of this genus are found in the gut of the biting flies, in predatory and plant-frequenting bugs, in mosquitoes, and in ticks. In *Trypanosoma* we have the blepharoplast placed at the very extreme posterior end and an undulatory membrane very well developed. These forms are parasitic in the vertebrates. These distinguishing characters are usually very well pronounced, but in the gut of some of the nonbiting flies, especially in *Sarcophaga*, all gradations are present as far as the location of the blepharoplast is concerned; for instance, this may be anterior or posterior to or near the nucleus; the undulatory membrane, however, is always absent. It is clear that *Leishmania* belongs to the first-named genus of these flagellates, and, as mentioned before, very similar to *H. lygæi* and *inhospes*. The question, then, is, Should we still retain the genus *Leishmania* for the parasite of kala-azar or incorporate it in that of *Herpetomonas*? As more investigations are made amongst parasites of this group other generic distinctions will be discovered, thus necessitating a further splitting up of the genus *Herpetomonas*. Already an attempt has been made to re-create a new genus, *Leptomonas*, for herpetomonads found in nonbiting diptera of the genus *Drosophila*. These forms are very like *H. lygæi* and *inhospes*, and as mentioned before, these two species are almost identical morphologically with *Leishmania*; consequently this genus may be merged in *Leptomonas*. But as *Leishmania* has, so far as is known at present, a peculiarly limited habitat, i. e., restricted to mammals, we are compelled to retain this genus, not so much on morphological as on œcological grounds. The old genus *Herpetomonas* may be split into:

Herpetomonas, the type being the large flagellate, *H. muscæ-domesticæ* (Burnett), occurring in the gut of the common house fly.

Leptomonas, a smaller and slenderer form, found in the gut of the plant-frequenting bugs of genus *Lygaeus*, etc. Type *L. drosophilæ* (Chatton and Allaire).

Leishmania, the form occurring in mammals, the type being *L. donovani* (Laveran and Mesnil).

* * * * *

The mode of transmission of this ailment is still doubtful. Patton has, however, made a step in this direction by finding flagellate forms of *Leishmania* in the gut of the common bug (*Cimex rotundatus*) of Madras. These insects he fed on severe cases of kala-azar, in which the parasites existed in large numbers in the peripheral blood stream; but he was successful in only one case, as well as I recollect. Further attempts he made this year (1908) in this direction were not successful. I have on several occasions tried to confirm Patton's find by feeding the bedbugs on kala-azar patients, but have not up to the present met with any success. Being dissatisfied with my attempts in bringing about an infection of *Cimex* with *Leishmania* and procuring the flagellate forms, I searched for some other blood-sucking insect of local distribution and not so universally spread as the ubiquitous bedbug, and at the same time commensurate in its range with the occurrence of kala-azar. In my search I came across an insect answering one of the two above desiderata, and although up to the present I have not met with any success in propagating, much less transmitting, *Leishmania* by its means, I consider the find may be an interesting factor in the causation of some disease not necessarily kala-azar. The insect in question is a black and red bug (*Conorrhinus rubrofasciatus*) of large dimensions, about 20 to 25 mm., or, roughly speaking, about an inch in diameter. It comes occasionally to the light of a lamp into rooms at night, and appears to be widely spread in Madras. It is popularly supposed to suck the blood of human beings and also to feed on the common bedbug. From its latter propensity it is called, according to some of my informants, the "mother of bugs," on account, I suppose, of her unmatronly habit of devouring her smaller relations. This predatory habit on bedbugs is also attributed to its European representative, *Reduvius personatus*; so a certain amount of credence is to be placed on the above popular statements of its habits. Both the male and the female insects I have captured contained either fresh or digested mammalian blood in their guts; whether human or not I regret I am unable at present to determine, but hope to procure the opinion of a bacteriologist at some subsequent date. These bugs readily suck human blood when placed, confined in a glass-bottom box or a test tube, on the body of a person; they insert their proboscis and begin to suck as if to the manner born. Both the male and female imagoes suck human blood, but the nymphs are much more bloodthirsty, starting to insert their proboscides immediately they are placed on a patient, while the adults take a minute or more before they settle down to a meal. In the gut of the adult insects, in nearly 90 per cent, large numbers of flagellates of the genus *Crithidia* are found, but no *Herpetomonas*. This reduviid bug has a wide distribution, both in and out of India. Distant, in the Fauna of British India Series, Rhynchota, Vol. II, p. 286, gives the following habitats: Sylhet, Bombay, Borghat, Calcutta and Mysore, Ceylon, Andaman Islands, Burma, Toungoo, and Mandalay. Outside India it is widely spread throughout the Malayan Peninsula and Archipelago; recorded from Madagascar, West Africa, and generally found in the southern nearctic and northern neotropical regions and in the Antilles. As mentioned before, this insect's habits are nocturnal, both the male and female; the former more frequently fly into the veranda or room, attracted by light. It is found all the year round, and I have procured specimens from all parts of the city of Madras.—(R. C. H.)

PATTERSON, H. S. *Endemic amœbic dysentery in New York, with a review of its distribution in North America.* American Journal Medical Sciences, Vol. CXXXVIII, August, 1909, p. 198.

Patterson cites 3 cases in which he found the active motile amœba in the mucous discharge obtained by proctoscope. He states that among New York physicians the belief is current that intestinal amœbiasis is to be expected only in persons recently returned from the Tropics. To refute this opinion he mentions as occurring endemic to New York City beside his own cases the case by Brannon, 2 cases by Graser, 2 cases by Brooks, and 10 cases by Libman.

Regarding the distribution in North America, Patterson writes:

Canada: The late Dr. A. Brayton Ball reported a case in 1892 that originated in Winnipeg. This was the first case to be reported from New York City.

Maine: Lockwood's case in all probability contracted the disease in Old Orchard Beach.

New Hampshire: One of the earliest American cases on record was that of Gerry and Fitz, who in 1891 contributed the history of a young woman who was supposed to have contracted the disease in the White Mountains.

New York: Stockton reported in 1894 an endemic case from Buffalo. He mentions a case occurring in his practice the preceding year. Nydegger mentions a case occurring in the practice of a medical friend in the northern part of the State.

Pennsylvania: Musser was among the first to report endemic cases. In December, 1890, he reported from Philadelphia 2 hospital cases and mentioned 2 occurring in private practice. About the same time Stengel reported 3, 1 of which was a private case alluded to by Musser. A few years later Musser and Willard reported another case from Philadelphia.

Maryland: In 1890 Lafleur reported the first endemic case in this country. Since then Howard, Street, Preston and Rurah, Lewis, Amberg, and Boggs have reported a large number of cases.

District of Columbia: In a series of cases treated at the Johns Hopkins Hospital Boggs reported 3 from the District.

Virginia: In the series just alluded to Boggs reported 14 from this State. Slaughter has reported a case probably infected in Richmond.

West Virginia: In the series reported by Boggs 8 acquired the disease in this State.

North Carolina contributed 5 cases to Boggs's series.

South Carolina: Wasdin has reported 3 cases.

Georgia: Boggs has contributed 4 cases, Wasdin 1, Harris 32, and Diamond 3.

Florida: Boggs has contributed 2 cases. I myself have seen 2 cases which were infected in this State.

Tennessee: Boggs's report includes 1 case from this State, while Harris has reported 2.

Alabama: Boggs has reported 4 cases, Harris and Withington 1 each, while Taylor has reported a fatal case from the center of the State.

Mississippi: McElroy reports a case from Stovall.

Ohio: Eichberg, in 1891, reported from Cincinnati a case of amœbic liver abscess, no statement being made that the case was imported.

Illinois: Kurtz has contributed a case from Neoga, while Preble, from Chicago, reports 2 cases; the first patient had lived for nine years in the city, and had been in the country a few weeks six months previous to the beginning of the illness. The second patient had not been out of Chicago for thirty years.

Missouri: Nietert has reported 7 cases which developed in or near St. Louis. Meyer observed a case in St. Louis and mentioned one of Fischel's, while Funkhouser has seen one originating in the same city. Murphy has contributed a case from Kansas City.

Michigan: Dock, in 1902, reported 1 case infected in Michigan. The patient had not been out of the State since 1893. There is no history of any contamination by persons returning from the Tropics.

Minnesota: Head, in 1904, reported a case originating in Maple Lake, Itasca County, and in 1905, Aurand, a case in a millworker who had lived in Minneapolis many years and had never been South.

Montana: Spelman and Wherry, in 1906, reported a case which was unquestionably infected in Montana.

Arkansas: One of West's cases was probably infected in this State.

Indian Territory: West contributed 1 case from here.

Texas: Boggs has contributed to the literature 2 cases. Hektoen has reported 1; Dock, in one report, 1 case, in a second, 12; Diamond, 2 cases, and West, 3.

The review of the literature on this subject shows, therefore, that the prevailing idea concerning the source of amœbic infection is hardly justifiable. Probably this erroneous belief has been responsible for failure to recognize the disease. A realization that this type of disease is endemic in New York led to a search for it, with a result that these three cases were found within a year. It is to be hoped that a realization of its existence elsewhere will give rise to the recognition of cases and to the establishment of proper prophylactic and therapeutic measures.—(R. C. H.)

CRAIG, C. F., captain, Medical Corps, U. S. Army. *Filaria (Microfilaria) philippinensis*. Journal of Tropical Medicine and Hygiene, August 16, 1909, p. 239.

Craig in this paper reviews his reasons for regarding the *Microfilaria philippinensis* as a distinct species.

The morphological characters which distinguish it are, according to Craig, the so-called "granular spot," or viscus, the character of the sheath, and the abruptly attenuated tail of the parasite. The sheath is stated to envelop the body tightly and is generally only seen as a thread-like flagellum at the extremities of the worm. He states further that the *M. philippinensis* has two forms of motility, one lashing and progressive while still inclosed in its sheath and being unimpeded by it. When moving forward the anterior end of the sheath bends backward along the side of the body.

With regard to the periodicity, Ashburn and Craig found that the parasite, unlike the *F. bancrofti*, could be found in the blood at all hours of the day and night, and further, that the number was practically the same at all hours.—(R. C. H.)

PHALEN, J. M., and NICHOLS, H. J. The distribution of *Filaria* in the Philippine Islands. The Philippine Journal of Science, April, 1909, p. 127.

These authors report the result of nearly 6,400 examinations of the blood from localities pretty well covering all of Luzon, the principal islands of the Visayan Group, the northern end of Mindoro,

and scattered sections near the coast of Mindanao. Among this large number they found 127 cases, or about 2 per cent. While the positive cases were not studied with a view to identification, the parasite fulfills the requirements of the microfilaria of the *Filaria bancrofti*. No example of *Filaria philippinensis* (Ashburn and Craig) was observed by them. Army medical officers in the southern islands have reported a microfilaria without a sheath and with apparently a diurnal periodicity.

Among the lower animals, the *Filaria immitis*, and a filarial parasite of the horse similar to the *Filaria loa* of man, which it appears is probably the *Filaria papillosa*.—(R. C. H.)

BORBELL, A. *Acarions et cancers. Acarions et lepre. Annales de l'Institut Pasteur*, February 25, 1909.

The author calls attention to the frequent inclusion of the Acarina within the cell nests of epitheliomata and lepromata and suggests the possibility that these arachnoids act as carriers of the cancer virus. He suggests the same possibility in the transmission of leprosy. The most important of the Acarina is the *Demodex folliculorum*.—*Passed Asst. Surg. O. J. Mink.*

BOEHM. *Necator Americanus in Ceylon. Arch. für Schiffs und Trop. Hygiene*, 1909.

This worm was found in Ceylon in two cases which, however, did not have striking clinical symptoms. The worm appears to be spread over a large part of the old world.—*Passed Asst. Surg. O. J. Mink.*

OZZAKIN, P. A. *Anæmia due to Trich. dispar. Woenne-Medizinskij Journal*, 1908.

The anæmia is considered to be due to the activity of a toxine produced by the parasites. The most efficient vermifuge was found to be thymol.—*Passed Asst. Surg. O. J. Mink.*

MAUSIL NICOLLE and REMLINGER. *Study of the protozoa of J. H. Wright, in 16 cases of Aleppo Boil. Bull. de la Soc. de Pathol. Exotique*, 1908.

The parasite of Wright was found in 16 cases. The parasites were in the mononuclear as well as the polymorphonuclear cells.—*Passed Asst. Surg. O. J. Mink.*

TROPICAL MEDICINE.

Surg. C. S. BUTLER, U. S. Navy.

M. CHARLES NICOLLE. *Le kala azar infantile*. Annales de l'Institut Pasteur, May and June, 1909.

From his extensive work on this subject the author draws the following conclusions:

1. There exists in Tunis, and probably in parts of Italy, a special infection which affects children during the second year. All races, both European and native, living in Tunis are susceptible.
2. The onset is insidious, followed by characteristic symptoms, as extreme pallor, emaciation, hypertrophy of the spleen and to a less extent of the liver, œdema, irregular temperature with many rises and falls during the day, acceleration of the pulse, digestive disturbances, and a mononuclear leucocytosis. The malady is chronic and almost without exception fatal.
3. The diagnosis is made from the symptoms, the negative action of quinine and the presence of the parasite.
4. The parasite, a protozoan, *Leishmania infantum*, is obtained by puncture of the liver and spleen. Examination of the peripheral blood has given inconstant results.
5. At autopsy the spleen is enormous but of normal aspect, color, and consistency. The liver shows less hypertrophy and the bone marrow is red. Smears from these organs show the parasite in great numbers, other organs less frequently or not at all. The protozoan is free or in mononuclears of the vascular endothelium type.
6. The protozoan resembles the *Leishmania donovani* of Indian kala azar in all respects except that it affects children exclusively.
7. The parasite has been cultivated upon a modified Novy-MacNeal medium.
8. The disease has been reproduced in the dog and monkey. Other animals appear immune. Animals infected have a somewhat typical symptom complex, the autopsy findings are quite similar and the protozoan is present. The infection does not appear to pass from mother to foetus.
9. Infantile kala azar is a natural infection of dogs and transmitted by them to children. Of 222 dogs examined in Tunis, 4 were found infected.
10. The author suggests that the disease is more widely spread than appears at present, and recommends a closer search for its presence.—*Passed Asst. Surg. O. J. Mink.*

PEARSE, FREDERICK. *On the identity of beriberi and epidemic dropsy*. Journal of Tropical Medicine and Hygiene, 1908.

The clinical appearances of beriberi and epidemic dropsy in Calcutta are so similar that, in the opinion of the author, the two diseases are identical.—*Passed Asst. Surg. O. J. Mink.*

STRACHAN, P. D., M. A., M. B., Ch. B., and BIRT, C., lieutenant-colonel, Royal Army Medical Corps. *Malta fever in South Africa*. Journal Royal Army Medical Corps, Vol. XIII, No. 2, August, 1909.

Strachan revises opinions of semeiology, epidemiology, distribution, and treatment based upon recent observations and concludes "that

Mediterranean or undulant fever occurs in many parts of Cape Colony" and that "on treatment the less said the better." Injections of *M. melitensis* vaccine seem to have brought about rapid recovery in a few chronic cases. Cyllin in intestinal capsules may have contributed toward shortening the period of pyrexia in several instances.

Birt concludes:

1. Examination of the blood of 177 persons resident in South Africa has shown that they have been infected with the *M. melitensis*.

2. The *M. melitensis* has been isolated from 1/50 to 1/10 c. c. of blood preserved in glass capsules for three to six weeks in 33 cases.

3. Emulsions of the *M. melitensis* sterilized at 55° C., with the subsequent addition of 0.5 per cent phenol mixed with the diluted blood serum, and drawn into glass tubes of 1 mm. in diameter, afford a sure and ready method of the diagnosis of Malta fever. This plan can be adopted by any practitioner, though unprovided with laboratory facilities.

4. Specific blood retains its agglutinating property for weeks or months, even when contaminated.

5. There is a widespread epizootic of Malta fever among the goats of South Africa. Their milk conveys the infection to man.—*Surg. C. N. Fiske*.

HEISER, V. G., M. D. Leprosy in the Philippine Islands and its treatment.^a
Am. Jour. Med. Science, Vol. CXXXVIII, No. 3, September, 1909.

Reaffirming his argument of two years ago, Heiser maintains that the results attained by segregating lepers on Culion Island, whereby the incidence of leprosy has decreased by about 57 per cent in the islands during the past three years, justify such humane detention in spite of the doubt of well-informed persons with regard to the communicability of the disease.

During the American occupation the number of lepers has diminished from a probable 3,500 or 4,000 to 2,291, the number of deaths exceeding the number of new cases by 1,409. He urges the great importance of early diagnosis, particularly by recognition of the initial ulcer or its resulting cicatrix on the nasal septum, and by bacteriological examination of the nasal section. Americans have contracted the disease within two years of their arrival.

Of the many "treatments tried, the X rays is the only one which produced a cure, but as yet it is suitable only for specially-selected cases."—*Surg. C. N. Fiske*.

^a Read by title at the sixth annual meeting of the American Society of Tropical Medicine, U. S. Naval Medical School, Washington, D. C., April 10, 1909.

CHOSKY, KHAN BAHADUR N. H., M. D. The various types of plague and their clinical manifestations.^a Am. Jour. Med. Science, Vol. CXXXVIII, No. 3, September, 1909.

In addition to the more common types of plague, Chosky refers to the cellulo-cutaneous form which he described in 1900, and submits six illustrations of this relatively rare phlegmon. His experience at Bombay leads him to state that of 13,600 cases occurring in 12 epidemics, 92.8 per cent were of the bubonic type, 3.7 per cent the cellulo-cutaneous, 2.4 per cent the septicemic, 1 per cent the pneumonic, and but 0.1 per cent the ambulant. The clinical charts submitted seem to be peculiar for each type, but vary chiefly in duration, the cellulo-cutaneous having the longest fever curve and, next to *pestis ambulans*, being the most benign in having a recovery rate of 36 per cent. In the cellulo-cutaneous type, instead of a rapidly ensuing lymphadenitis or septicemia, a progressive local necrosis develops from the point of infection and may spread over extensive surfaces of the body.

In 8 or 10 per cent of plague cases phlegetenules, pustules, or bullæ appear at the site of infection and in the type under consideration, upon the breaking of the epidermis, there is found a dark spot, which increases in size until either a secondary septicemia causes death or the ulceration has run its course, when an extensive sphacelus separates, frequently exposing muscles, bones, and other structures; this loss of tissue may be enormous while buboes are few and inversely proportional to the extent of ulceration and the general systemic symptoms may be only those of an ordinary cellulitis. The greater the area of necrosis, the more probable becomes a terminal septicemia. In severe but favorable cases the temperature falls by lysis during the third week.

One interesting point brought out is that the only known recoveries from the pneumonic type have occurred where another organism, *B. pyocyaneus* or the *pneumococcus* has been found associated with *B. pestis*.—Surg. C. N. Fiske.

HYGIENE AND SANITATION.

Medical Insp. H. G. BEYER, U. S. Navy.

DOTY, ALVAH H., M. D. (health officer of the port of New York). The means by which infectious diseases are transmitted. Am. Jour. Med. Science, Vol. 138, No. 1, July, 1909.

The fomites theory, according to Doty, should be practically abandoned because instances under which diseases are transmitted by clothing, rags, cargoes, money, etc., occur so seldom that vigilance in their direction is largely misplaced and they are only entitled to secondary consideration. From his observations made during the

outbreak of smallpox and typhus fever in New York in 1892-93, in which the attempt was made to discover the exposure in each case, those apparently due to fomites were found to be coincidences, which in each and every case followed up were proven to have had at some time unnoted personal exposure; he believes this to be also true of scarlet fever and measles, although the specific organisms of none of these four diseases is yet known.

Outbreaks of contagious disease at the beginning of the school year are now recognized to depend upon personal contact with mild cases of the exanthemata or diphtheria carriers and not upon exposure to undisinfected clothing.

Doty refers to his researches at the rag depots of Alexandria, Egypt, which handled the cast-off one-piece garments worn next to the skin in many cases of smallpox; he found that the incidence of this and of other diseases was no greater among the rag sorters than among those following other pursuits; he failed also to find any satisfactory evidence of disease being transmitted by the handling of money at the Treasury Department in Washington. Hildritch is quoted as saying that the bacteria present on paper money are non-virulent, and the forms most present are the air forms.

Cholera and plague should be brought to New York in old rugs from the Orient if they were a means of transmission of these diseases; cargoes of vessels arriving at the New York quarantine station are not disturbed even when infectious diseases are found on board, and no harm appears to arise therefrom.

The impossibility of thoroughly disinfecting typhoid stools as ordinarily attempted, by the use of solutions of carbolic acid or chloride of lime, or the throwing of powdered lime in privy vaults, merits greater attention than the elaborate disinfection of clothing and house furnishings. Heat, in the form of fire or boiling water, is the only sure means of disinfection. The possibility of disease being conveyed by freshly contaminated bed linen, etc., is fully recognized, but its rarity renders its importance subordinate to that of personal contact with the sick. Doty believes that we should better devote our energies toward discovering the mild ambulatory cases among the apparently well, and instances two men going through quarantine at New York who were able to perform their ship duty, yet when their temperature had been taken and careful glandular examination had been made they were found to have bubonic plague.

One paragraph of this article is of great importance industrially:

The requirement of the fomites theory frequently involves the detention at home of those who have been exposed to infection, or in whose home infectious disease may exist, for the reason that the clothing of these people is believed to transmit disease. In many instances this is a great hardship, and frequently seriously interferes with the family revenue. The modern view of this subject

does not justify this procedure, particularly when the patient is properly isolated and cared for. In these instances it is only required that a daily examination shall be made of suspects, which should include the use of the thermometer to early detect the invasion of disease.

Unnecessary disinfection, or perfunctory disinfection, where thoroughness is required, is to be condemned; whatever must be done should be handled by experts and in a scientific manner.—*Surg. C. N. Fiske.*

GOODALL, HARRY W., M. D., and BELKNAP, J. LYMAN, M. D. A critical study of the value of the measurements of chest expansion and lung capacity. The Archives of Internal Medicine, April, 1909.

Supplementing their former work, the report of which was reviewed in the Bulletin, Vol. II, No. 3, page 115, these observers, after outlining the mechanics of respiratory movements, graphically illustrate their findings in a series of six tables; for these studies males between the ages of 20 and 45 were selected.

Table I shows the relation between chest expansion and the type of breathing in seven instances of each type. The average expansion from costal breathing was 3.3 inches and lung capacity 233 cubic inches; during abdominal breathing the expansion averaged but 1.2 inches, while the capacity was 230 cubic inches.

Tables II and III show the effect of voluntary action on chest expansion and lung capacity before and after instructing seven men to breathe deeply and relax the abdominal muscles.

While solely attempting to fully expand the chest the average was 3.6 inches, while the cubic capacity was only 160 cubic inches; after disregarding expansion and with a view to blowing the needle of the spirometer as high as possible, the expansion averaged but 2.5 inches, while the lung capacity was 227 cubic inches.

Table IV shows, in ten selected cases, the expansion and capacity in extreme types of abdominal breathing as compared with those in which muscular contraction was not entirely eliminated; in the former the average expansion was 1.4 inches and capacity 246 cubic inches, while in the latter the expansion was 2.6 and the capacity only 191 cubic inches.

In order to determine the relation of muscular development to expansion and capacity, individuals were selected from (1) those seeking treatment at an out-patient department for some functional disorder, but clinically free from pulmonary disease, (2) students doing some gymnasium work, and (3) blue jackets and marines on the U. S. S. *Wabash*.

Table V gives the average measurements in these three classes of muscular development as follows:

	Chest measurement.			Lung capacity.
	Full expiration.	Full inspiration.	Chest expansion.	
	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>	<i>Cu. inches.</i>
Hospital patients	32.7	34.9	2.2	191
Students	34.3	36.2	1.9	235
Bluejackets and marines	33.7	36.5	2.8	248

Table VI indicates that among the above 200 hospital out-patients, while in general the average lung capacity was proportional to the expansion, still there occurred marked exceptions. For example, 20 having a lung expansion of from 3 to 3.5 inches averaged 214.2 cubic inches capacity, while 14 having from 3.5 to 4 inches expansion averaged but 195.3 cubic inches.

A diminished expansion and capacity is shown to result from loss of strength of the respiratory muscles, loss in lung tissue, and limitations to the amount of air which could be inspired from nasal or laryngeal irritation or obstruction, yet a capacity of 191 cubic inches was found to be consistent with a normal lung, and a lung capacity of 260 cubic inches with 3.5 inches expansion appeared in a case of early phthisis.

Goodall and Belknap arrive at the following conclusions:

The measure of chest expansion has no constant direct relation to the lung capacity, and by itself is of comparatively little value as one of the methods of physical examination. Large measures only indicate good development of the muscles which expand the chest. Owing to individual variations normal standards can not be adopted. It is probable, however, that an expansion of from 2 to 2.5 inches will permit the maximum capacity under ordinary conditions of health.

In normal individuals the measure of lung capacity varies directly with the muscular development, provided the individual breathes properly. Erroneous conclusions may be drawn from spirometer readings unless special attention is given to the method of breathing. Capacities of 190 cubic inches, and possibly less, are consistent with normal lungs.

With both measurements large values only indicate good muscular development. Low values indicate inferior muscular development or improper breathing.

In suspected pulmonary disease very little, if any, additional aid in diagnosis is obtained by these measurements. The only positive value of the measurements is the aid in determining whether or not the person is breathing properly and whether or not the muscles of respiration are properly developed.

The importance of these observations to the examining surgeon at naval recruiting offices depends largely upon the purpose for which chest-expansion measurements are undertaken. If for the indication of disease, the standard requirement of 2 or 2.5 inches is obviously of little value; if it is intended that the amount of expansion shall

serve as an index of general muscular development, and this condition is considered a measure of robustness in spare youths of apparently questionable physique, the test would seem to possess considerable merit; medical officers having much experience in the physical examination of recruits have long been aware of the fact that the improper use of accessory musculature gives misleading figures in chest expansion, and against such a factor they are usually upon their guard.—*Surg. C. N. Fiske.*

CARTER, H. R., M. D., surgeon, U. S. Public Health and Marine-Hospital Service, (Director of hospitals, Isthmian Canal Commission). **Notes on the sanitation of yellow fever and malaria. From Isthmian Experience.** Medical Record, Vol. 76, No. 2, July 10, 1909.

This eminent authority, before the section of hygiene, Pan-American Scientific Congress, at Santiago de Chile, December, 1908, emphasized the opposite direction which prophylactic measures should take in exterminating yellow fever in territory where the disease is endemic from that pursued in a newly infected community.

In a yellow-fever country, where ambulatory and infant cases are perennial and general fumigation methods are violently opposed through lack of fear of the disease, the early detection of cases and isolation of all those infected is absolutely impossible, and except possibly as a protection to immediate neighbors the attempt to control the human host is practically fruitless. Here every effort should be made to exterminate and prevent the further breeding of mosquitoes, work which will at least not be antagonized by and may receive the passive cooperation of the natives. Success in this direction will convert the place into "noninfectible territory," and the arrival of yellow-fever cases need cause no great concern.

Wherever the disease is not endemic, when cases are introduced the control of the human host is quite as important, and the examination of suspects (contacts), screening of all fever cases for the first three days, and fumigation of infected premises should go hand in hand with widespread antimosquito work.

In principle the same ideas are applicable for the control of malaria, but the elimination of this disease is an infinitely more difficult problem than is that of yellow fever. *Anopheles* breed in extensive swamps and travel considerable distances, while *stegomyia* are quite domestic. The nonsick human host can not be controlled, and is continuously infective as long as the parasites remain in his blood. On the Isthmus the methods are:

1. To prevent the breeding of *anopheles* by destruction of their breeding places.
2. To kill their larvae in such breeding places as we fail to destroy.

3. To prevent the access to the men we would protect of such anopheles as exist in spite of the above means to destroy them.

4. So to arrange it that those anopheles, which, in spite of No. 3, do have access to the men we would protect, have not had an opportunity of becoming infected with malaria.

5. So to immunize our men against malaria that even if bitten by infected anopheles they may not develop malaria.

Any one of the above methods perfectly carried out would be sufficient.

Carter shows that the effort to control malaria must be made mainly from the insect end of the chain and that because of the great difficulties and expense involved the reduction of sickness and mortality to the amount "allowable from an economic and humanitarian standpoint" may be considered satisfactory and all to be practicably attained.—*Surg. C. N. Fiske.*

AINSWORTH, R. B., captain, Royal Army Medical Corps. **The house fly as a disease carrier.** *Journal Royal Army Medical Corps*, Vol. XII, No. 5, May, 1909.

This officer from his observations at Poona and Kirkee, India, shows by a series of 20 charts that in the past fifteen years rainfall and typhoid admission do not stand in a relation of cause and effect. The seasonal prevalence of the disease, with more admissions during August and September than all the other ten months put together, corresponds to the four monsoon months, July to October, but the local water supply is so well guarded from contamination and the analysis is so satisfactory that here, at least, typhoid is known not to be water borne; dust is likewise excluded because of its absence during the rainy months. Out of 92 cases of typhoid in 1908, 40 were genuine cases among natives, the bacillus being demonstrated in many instances. Flies were caught and counted on sticky fly paper daily in supposedly fly-proof kitchens and each increase in their numbers was followed by corresponding rise in typhoid admissions. The native heretofore considered as hardly susceptible to the disease is now from his careless habits considered to be the human, and the fly the (intermediary) insect, carrier. This experience seems to correspond with the findings of Aldridge for typhoid and of Snell for infantile diarrhea, that both of these highly fatal diseases are vastly more prevalent in districts where and shortly after myriads of flies appear.—*Surg. C. N. Fiske.*

GENERAL MEDICINE.

Surg. T. W. RICHARDS, U. S. Navy.

GIBB, JOSEPH S., M. D. A study of the aural and laryngeal complications of typhoid fever, especially as observed in hospital practice. *Pennsylvania Medical Journal*, Vol. XII, No. 10.

Based upon wide experience, particularly during the unfortunate prevalence of typhoid fever in Philadelphia prior to the late improvements in the water supply, this paper, here too briefly condensed, impresses one with the importance of the subject-matter and the thoroughness and accuracy of the writer's observations.

The ear: Dullness of hearing due to high temperature and toxæmia is a common accompaniment of typhoid, and varies in intensity from a slight impairment to total deafness. Cases of this nature are usually noninflammatory, and there is no lesion of the membrana tympani nor deposit of lymph within the tympanic cavity. They may occur in mild types of the disease but are much more common in the severe ones, especially during the period of high temperature. The prognosis is good, restoration of hearing usually occurring as soon as the febrile period is passed, but it may be delayed until many weeks after recovery. Strychnine and iodide of potassium have seemed to be of service.

Deafness during typhoid may come on suddenly as a result of hemorrhage into the tympanic cavity, but such cases are rare, and only occur in the severest forms of the disease. Almost coincident with the loss of hearing there is a discharge of blood from the auditory canal; examination shows a perforation in the tympanic membrane, the tympanic cavity being filled with clots or oozing liquid blood. In the two cases observed there was no indication of purpura. Both recovered with slight impairment of hearing. Treatment consisted in local antiseptics.

Inflammation of the middle ear is a common complication, occurring in 10 to 20 per cent of cases.

The more severe cases are those usually attacked, but inflammation of the middle ear may occur in the mildest case. The inflammatory attacks are often severe, usually with excessive suppuration and often tinged with blood or even pure blood may accompany the discharge. A large proportion of the cases have symptoms of mastoid irritation accompanying the middle-ear inflammation, but by no means all of these latter result in mastoid suppuration.

Since suppurative otitis media in typhoid fever is apt to be of great severity, it is of much importance that early and prompt attention be given to avert permanent loss of function, or even a fatal termination. The suppuration is usually so profuse and of such

virulence that without great care as to cleanliness and antiseptics excoriations of the pinna, lobe, and surrounding tissues will occur; therefore the auditory canal should be thoroughly cleansed with warm boric-acid solution and then wiped out with peroxide of hydrogen, and this should be done frequently enough to insure thorough cleanliness. In severe cases it becomes necessary to so treat the ear every hour or so.

The foregoing represents the mild forms of aural complications of typhoid fever. A much more serious one is that in which the mastoid cells become the seat of infection. Every inflammation which attacks the mastoid cells does not go to the extent of the formation of pus in the latter cavity, and prompt, energetic treatment often averts this lamentable complication. However, a certain proportion of cases inevitably terminate in abscess, and in a given case of middle-ear suppuration we should be alert and watchful for its development. Some cases are of so malignant a nature as to run rapidly into abscess within a few days, or even hours, of the appearance of the middle-ear involvement. In a larger proportion of the cases the abscess of the mastoid cells does not occur until a long time after the incipency of the disease, often being delayed until convalescence is established. The appearance of redness, oedema, and tenderness over the mastoid process should be the signal for active and energetic treatment. Should the condition be one of retarded drainage, the proper treatment is to afford freer exit by an incision of the tympanic membrane or of the oedematous tissues of the canal, as the case may be.

So many cases of threatened abscess are averted by this measure that the writer considers it advisable to enlarge a small perforation before the appearance of mastoid symptoms. Hot and cold applications, preferably the latter, should be employed, but if decided improvement is not apparent within thirty-six hours the mastoid cells should be opened without further delay. Operation should be radical and include the removal of all areas of necrosis, which are often of astonishing extent.

The pharynx: Probably from 2 to 3 per cent of patients suffer from laryngeal involvement during the course of typhoid fever. Following Friedrick, the writer divides these affections of the larynx arbitrarily into three classes—(1) the catarrhal, (2) the ulcerative, (3) the paralytic.

The former are most frequently observed. There may be simply the picture of an acute laryngitis, improving as the disease improves, or the inflammatory process may involve the submucous tissues, with more or less stridor and interference with the respiratory act.

Clinically, there is much diversity in the severity of these cases, in accordance with the site of the infiltrate, those above the cords being of much simpler type than those subcordal. This particular form of

laryngitis, unlike the simpler form, occurs after the severe febrile symptoms have abated. Usually it is ushered in by a sudden rise of temperature when the thermometer has been running at or near the normal point; the onset is usually gradual. In addition to the elevation of temperature there is increasing hoarseness, even aphonia and increasing stridor, which sometimes becomes alarming. The course of this œdematous laryngitis is likely to be prolonged, in some instances leaving permanent effects, noticeable by a limitation of the movements of the intrinsic muscles of the larynx and a consequent impairment of the voice. The most distressing and alarming effect of the infiltration is an encroachment on the respiratory channel, which may demand intubation or tracheotomy.

The ulcerative form usually occurs in the severe cases, either in the febrile or post-febrile stage. These ulcers are superficial, the most common sites being the laryngeal surface of the epiglottis, over the arytenoid cartilages, and on the posterior wall. Similar ulcerations are seen in the nasal septum and the lateral pharyngeal walls. They may run together, forming large superficial ulcerated surfaces, but without the infiltration of surrounding tissues which is observed in tubercular ulceration.

Very different from the simple form are the cases of ulceration extending to the deep tissues. This rarely occurs in other than the post-febrile stage of protracted, severe cases, and the writer is inclined to attribute them to local thromboses. Symptoms are urgent and there is apt to be alarming interference with respiration. Owing to œdema, laryngoscopic examination is unsatisfactory, and the site of the ulcer may be obscured, rendering diagnosis from the simple form difficult.

The ulcerative forms of œdema are much more serious than the simple inflammatory, and while most of the latter ultimately terminate in recovery, a large proportion of the ulcerative form terminates fatally. The degree of severity of this form is largely dependent upon the depth and extent of the ulceration; those cases in which the cartilages of the larynx are attacked, giving rise to perichondritis with abscess, seldom recover. Any or all of the intrinsic laryngeal muscles may be affected by paralysis. The severity of the case varies in accordance with the group of muscles involved. It may result in a temporary loss of function, or again a permanent impairment of the voice, and still again in conditions which end fatally.

According to the writer's experience, adductor paralysis is the most common and also most transient. In adductor paralysis, especially if bilateral, life is in great danger, the immobility of the cord in the median line leaving but a small chink for the passage of air. Immediate intubation or tracheotomy is frequently called for, but

may offer only temporary relief, since the alarming symptoms frequently reappear if an attempt is made to discontinue use of the tube.—(T. W. R.)

GAY, FREDERICK P., M. D. *The problem of cancer considered from the standpoint of immunity.* Boston Medical and Surgical Journal, August 12, 1909.

The author considers that experimental research on transmissible tumors in animals offers at last a hopeful prospect of combating this disease in man by vaccination or specific sera; nor does he believe that in the achievement of this result we are primarily dependent upon the discovery of a parasitical cause.

In reviewing the etiological theories hitherto propounded, the claims of bacteria, yeasts, and protozoa are summarily dismissed as so far untenable, though he apparently inclines somewhat favorably toward further development from the latter source. Physiological factors in the blood have been assumed to exercise some causal relation to cancer, either through a positive action in promoting the proliferation of epithelial cells or, conversely, by exercising normally an inhibitory effect, the absence of which permits the tumor growth.

In connection with the former hypothesis certain experiments by Starling, Loeb, and others with "hormons" are very suggestive. Thus injections of rabbit embryos caused hypertrophy of the mammary glands in virgin rabbits and lactation in animals which had borne young. While injury to the uterine wall of a pregnant guinea pig leads normally to proliferation of the decidual tissue at that point, such proliferation does not occur if the corpora lutea are first removed or destroyed: "In other words, the corpora lutea apparently form hormones which stimulate growth of decidual tissue."

To supply the deficiency in some suppositious inhibitory agent, the injection of normal serum (Edel), trypsin (Beard), and a ferment obtained from liver cells (Von Leyden and Bergall) have been advocated, but, it would seem, without conclusive results.

The suggestion of Albrecht and Ehrlich, that cancer cells grow more rapidly than normal cells, owing to their greater affinity for nutritive substances, is referred to without comment.

The older empirical attempts to treat cancer by specific methods are briefly touched upon, among the more important being the use of toxins from the streptococcus, isolated from cases of erysipelas, in combination with a toxin from the bacillus prodigiosus. Using this method, Coley reports some one hundred cases of inoperable tumor either greatly benefited or apparently cured.

In considering the experimental study of tumors in animals, we find that they occur in many mammals, and also in birds, fishes, and amphibians; they have not, however, been described in reptiles. Such

tumors may be benign or malignant, and the latter exhibit the same peculiarities that characterize malignancy in human beings.

While there is no authentic record of the transmission of a malignant tumor in the human being to another individual, tumors have apparently been transplanted from one part of the body to another, and the experimental transmission of certain tumors of mice and rats has now been successfully carried out through a long series of successive generations. The proportion of successful cases varies greatly, but may reach 100 per cent. Thus young animals take the tumor better than the older ones, and while technic, race, and environment are important factors, there seems to be a wide difference in individual resistance not directly traceable thereto. The tumor itself may vary in virulence during successive generations, and may change in cellular type; e. g., carcinoma into sarcoma, or vice versa, or carcinoma may become adenomatous in partially immunized animals. In general, old tumors are more apt to take than young ones, and it is probable that individual parts of a tumor may vary in virulence.

Now experiments have abundantly shown that not only may a given tumor fail to take, but that after successful inoculation tumors may show resorption and disappearance even after they have grown as long as four weeks.

Ehrlich's theory of "atreptic immunity" is the most systematic attempt to explain this condition of natural immunity to tumors in animals, and while too elaborate for detail here, some of his experiments and conclusions may be summarized as follows:

Mouse tumors inoculated into a rat show growth for about eight days, and then gradually disappear. If reimplanted in a mouse during this eight-day period, however, vigorous growth takes place, and such tumor may then again grow for about eight days in another rat; but no growth occurs if transplanted directly from one rat to another. Ehrlich assumes that certain substances which, directly or indirectly, act in furnishing nourishment to cancer cells are mechanically carried over in these cases and that the tumor will grow only so long as they last.

But an active immunity may likewise be acquired. The rat that was used in Ehrlich's experiments with the mouse tumor was found to resist the growth of a similar tumor for any period. Furthermore, animals which have resorbed a first tumor rarely take a second, or if they fail to take a first and second practically never take a third, and this is true, though the last inoculation is made with a much more highly transmissible strain. To some extent this is a panimmunity, for while a tumor which fails to take protects best against reinoculation with the same type, it also protects in lesser degree against others (e. g., carcinomata followed by sarcomata, etc.).

A third form of immunity, "which does not resemble in any exact way other forms of immunity which have been described," is produced by the injection of mice with tissue from another individual *of the same species*; whole blood, red blood cells, spleen, liver, and embryos have been used successfully in producing this result. But such injections must be made some time (ten days to two weeks) prior to transplanting the tumor; if tumor and mouse tissue are injected simultaneously the former does not protect.

The writer's experiments on the reimplantation of tumors in cancer animals and the probability of a cure through vaccination are extremely interesting, and are, in part, corroborated by other observations. Briefly stated, he found that if a second tumor was reimplanted immediately after removal of the first, this tumor failed to take in animals up to the thirtieth day of growth, whereas it took in them from that time on; as thirty days corresponds rather closely with the time usually taken for the development of metastases, it marks an important separation of the life history of the tumor growth into two periods. If a second tumor is implanted up to thirty or thirty-five days without removal of the primary tumor, not only does the second fail to take, but in approximately 50 per cent of the animals treated the first tumor disappeared and there were no metastases. At a later period, however, both tumors grew. From the above the writer concludes that this cure by vaccination corresponds somewhat with that of rabies, for example, and that the pre-metastatic period in cancer growth is one of incubation, the disease being considered declared only with the appearance of metastases. He concludes as follows:

It would seem justifiable, then, as a working hypothesis, to regard the pre-metastatic period of a tumor as a period during which the animal shows reaction products to cancer tissue, and during which period the animal is able successfully to combat a generalized infection of the cancer. In those cases in which spontaneous resorption of the tumor occurs, which, as we have already stated, are relatively frequent in animals and have also been described in human beings, we may suppose that the resistance of the individual has succeeded in overcoming the cancer. From our experiments in animals it would seem possible that during this premetastatic reaction period the resistance of the individual may be increased by reinoculation of the tumor, or possibly of products of the tumor, to such an extent that the resorption of the original tumor may be brought about. —(T. W. R.)

HEWLETT, R. TANNER, M. D. **Nine cases of typhoid fever treated with an anti-endotoxic serum.**

GOODALL, E. W., M. D.

BRUCE, R. M., M. D. (Supplementary reports.) *Proceed. Roy. Soc. Med.*, Vol. II, No. 8, June, 1909.

According to Hewlett, antityphoid serum prepared by the injection of the horse with cultures of the typhoid bacillus is useless in

the treatment of typhoid fever. He therefore utilizes an antiendo-toxic serum from a horse immunized by injection of a preparation from the ground bacterial cells.

He concludes from his results in 9 cases that "several were benefited by the serum, and in 2, at least, the disease was cut short."

Goodall and Bruce give their experience with the serum in 26 and 5 cases, respectively. The former concludes that in at least 7 cases there was reason to think the serum had a beneficial effect. In 1 case the temperature (103.5°) fell very abruptly two days after the second dose, and was normal on the third day, the fourteenth of the disease. In another case one dose was administered on the eleventh day, the temperature dropping from 103.5° to normal within a few hours and remaining there.

Doctor Bruce's results were less promising; he could only express the "impression that 2 cases, at least, were benefited," and that a third "would not improbably have run a more severe and prolonged course if the serum had not been used."

In a disease varying so greatly in duration and intensity, the above is, of course, quite inconclusive, but may, at least, warrant further trial. It is to be noted that while there was a decided serum reaction, as a rule, it does not appear to have been unduly severe or harmful. On the other hand, both Hewlett and Goodall hesitate to inoculate during a relapse, as marked toxic effects, in 1 case with convulsions, indicate that the phenomena of "hypersensitization" are to be anticipated if the serum is used after an interval of three weeks or longer.—(T. W. R.)

SURGERY.

SURGE. C. F. STOKES and RAYMOND SPEAR, U. S. Navy.

BECK, EMIL G., M. D. **Some practical points in the application of the bismuth paste in chronic suppurative diseases.** Surgery, Gynecology, and Obstetrics, Vol. IX, No. 2, August, 1909.

Beck repeats his conclusions brought out in a paper read before the International Congress on Tuberculosis last fall, viz:

Conclusions—

1. A successful surgical operation for tuberculous sinuses or fistula depends principally upon an exact knowledge of the extent, direction, and number of the sinuses before the operation is undertaken.
2. Radiographs obtained by previously injecting the sinus with a bismuth paste show distinctly the origin and extent of the sinuses. Such radiographs should always be taken before an operation is decided upon.
3. Tuberculous sinuses, fistulous tracts, abscess cavities, including empyema, can be cured by injecting them with a 33 per cent bismuth-vaseline paste, and in most cases surgical operations become unnecessary.

4. The formation of fistulous tracts may be prevented by opening cold abscesses, evacuating the fluid, and immediately injecting a quantity (not exceeding 100 grams) of 10 per cent bismuth-vaseline paste and not sealing the opening.

5. When sequestra are present, the injections should be tried for a reasonable length of time, and risky operations reserved as a last resort.

6. Bismuth subnitrate is a bactericidal, chemotactic substance which is slowly absorbed and slowly eliminated. Injections up to 100 grams of the 33 per cent paste produce no toxic effects. In large doses it may produce symptoms of intoxication, such as ulcerative stomatitis, black border of the gums, diarrhea, cyanosis, desquamative nephritis, and loss of weight.

7. While these injections are effective in all suppurative sinuses and cavities, those of tuberculous origin respond to them more readily.

8. The secretions from sinuses change their character after the injection, becoming seropurulent or serous, and micro-organisms gradually diminish and often disappear. Tubercle bacilli are no exception.

9. This method of treatment is applicable to the suppurative accessory sinuses of the head.

10. The patients regain their general health and gain rapidly in weight after the sinuses are closed.

Two common causes of failure are the presence of sequestra and inability to fill to the bottom tortuous sinuses. Many chronic cases branded as hopeless yield to this method of treatment. In acute conditions the paste is not indicated. One application a week is usually sufficient with daily change of top dressings. A paste composed of 33 parts of bismuth subnitrate and 67 parts of vaseline is recommended by Beck. Of this 100 grams can be injected without danger of poisoning. The paste is best removed with olive oil and not by scraping.

The field of usefulness of bismuth paste is broad, including chronic suppurative ear diseases and those of the nose and throat. Many of the chronic suppurative processes seen in the Tropics yield readily to this treatment. It can be used to advantage in dentistry and in veterinary work.—(C. F. S.)

STANTON, E. MACD., M. D. The sequence of the pathological changes in appendiceal peritonitis. *Surgery, Gynecology, and Obstetrics*, Vol. VI. No. 4. April, 1908.

Stanton says:

In a study of this kind, cases of appendiceal peritonitis can be divided into two quite sharply defined groups: First, those cases in which the primary intraperitoneal exudate is essentially fibrinous in nature, and thus a dry exudate; and, second, those cases in which the intraperitoneal exudate is from the first, or almost from the first, of a serous or sero-purulent type, and thus essentially of a fluid nature.

In the group of cases not primarily accompanied by fluid outside of the appendix there was usually present a more or less extensive dry, fibrinous, or fibrino-purulent perilappendiceal exudate, forming adhesions between the ap-

pendix and the surrounding viscera, chiefly the omentum, but also commonly involving to a greater or less extent the lower end of the cæcum, the parietal peritoneum in this region, and often one or more loops of the small intestine. Such adhesions, if their formation and stability be not interfered with by mechanical means, serve to limit the spread of the infection from the appendix, even though suppuration should later occur in its immediate vicinity. Evidences of the organization of this fibrinous exudate were first noticed on the third day, and this process of organization was well advanced by the fourth or fifth day, highly vascular granulation tissue having by this time largely replaced the primary exudate. Coincident with the beginning organization there was usually also evidence of a rapid absorption of the exudate, so that in the absence of continued or repeated infection, it is believed that this type of lesion rarely results in the formation of extensive, permanent organized adhesions.

In a certain percentage of this class of cases the character of the infection from the appendix was of such a nature as to lead to the later formation of a fluid, purulent exudate in the immediate vicinity of the appendix, which exudate was from the first limited by the fibrinous adhesions. Under these circumstances the wall of the pus cavity is formed, during the first three or four days, by soft, very easily ruptured fibrinous adhesions. As in the cases without free pus, organization of these fibrinous adhesions was first noticed on the third day, and the fibrin was very rapidly replaced by the granulation tissue, so that by the sixth or seventh day true abscess cavities were encountered, surrounded by the usual granulation tissue. Clinically, when these cases were treated with the idea in view of limiting, as far as possible, mechanical factors which might interfere with the stability of the adhesions, there was never any evidence of a marked tendency for this type of lesion to spread beyond its early limits.

In sharp contrast to the type of case described above is the second group, in which from the first, or almost from the first, the dominating intraperitoneal exudate is fluid in character, with, during the first few days of the attack, little evidence of the localization of the area of inflammation. It is this group which comprises the cases having a clinical history of early diffuse peritonitis, often of an alarming character, and yet even in these cases there can be no doubt but that every tendency of the inflammatory process itself is toward the localization of the lesion, for it was in these very cases, providing only that disturbing mechanical factors were eliminated, that we encountered a most definite and uniform process of localization of the inflammatory area, as shown by both the clinical course of the disease and the pathological findings.

This class of cases presented such a striking uniformity in the essential characteristics of the intraperitoneal lesions, as they were encountered at operation during each of the succeeding periods following the onset of the infection, that the pathological conditions will first be described as they have been encountered during each of these periods.

In cases operated during the first day, the intraperitoneal exudate was of a serous or seropurulent type. Fibrinous limiting adhesions were not present to a noteworthy extent, or were present only in the immediate vicinity of the appendix, which was often more or less completely surrounded by lightly adherent omentum. Beyond a more or less intense congestion of the blood vessels of the peritoneum, there was little, if any, noteworthy alteration of the serous surfaces themselves.

In cases operated during the second day, the intraperitoneal exudate was usually of considerable extent, and of a distinctly seropurulent or purulent character. The absence of well-defined, limiting adhesions was still noticeable, and the diffuse character of the lesion, in sharp contrast to the definitely circumscribed, periappendiceal abscesses seen at a later period. The peritoneal

surfaces already showed more or less loss of luster, with here and there adherent flakes of fibrin, but they did not, as yet, show the marked roughening seen after the beginning of organization of the third and fourth days.

In cases operated during the third day, the intraperitoneal exudate was of a distinctly purulent character. The gross changes in the involved peritoneum, especially in the immediate neighborhood of the appendix, were now very noticeable, due in part to the more abundant fibrin and in part to the changes in the peritoneum incident to the beginning organization, which seems in all cases first to become noticeable on the third day following the involvement of any given area of peritoneum. Limiting adhesions were now fairly well developed in most instances, but the lesions were as yet of a decidedly diffuse character, the area involved being much more extensive than at a later period, and there was as yet little or no evidence of the formation of sharply defined abscess cavities. It was at this time that the pus was encountered, extending irregularly between the various structures lying within the area of the peritoneum involved.

By the fourth or fifth days the process of organization was well established, the previously existing fibrinous adhesions becoming replaced by organizing granulation tissue, which was also noticeable over the surfaces of the peritoneum in direct contact with the purulent fluid exudate. This granulation tissue serves to encapsulate the pus, and it was from this time on that the formation of definitely defined abscess cavities was observed, they being at first more or less multilocular, but later becoming more localized in form, usually one well-defined cavity. The first evidences of the formation of a true abscess cavity were observed on the fifth or sixth days following the onset of the infection, although it was not until the seventh or eighth days that the cavities became sharply defined, with limiting adhesions firm enough to permit such manipulation as the packing away of the noninvolved intestines without great danger of accidentally opening the abscess at some undesired point.

The number of cases accompanied by pus outside of the appendix showed practically no increase after the third day, and, except in those cases giving a clinical history of a later acute exacerbation of peritoneal symptoms, there was no evidence of an increase in the area of peritoneum involved after this time. On the contrary, after the process of organization was well established, on the fourth or fifth days, there was every evidence of a progressive diminution in the extent of the peritoneal involvement, which became less extensive as the abscess cavity became sharply localized, and limited by the organizing adhesions.

This phase of the repair process, which results in the more or less complete resolution of the peritoneal lesion beyond the immediate wall of the abscess, was well shown in a number of cases coming to operation on the tenth and eleventh days, the clinical picture in each having been on admission that of severe diffuse peritonitis. In these cases the abscess cavities were surrounded by a narrow zone of organizing adhesions, while the peritoneum of the ascending colon and near-by loops of small intestine beyond the wall of the abscess cavity, although nonadherent, was thickened, reddish, and distinctly granular, without fibrin or other evidences of an acute lesion. The clinical picture was, on the third and fourth days, undoubtedly that of diffuse peritonitis, and this view was confirmed by the pathological findings, as observed later at operation, although by the tenth or eleventh days the diffuse lesion had so far cleared up as to leave but slight, though unmistakable, evidences of its having existed.

After the tenth day the adhesions were found to be increasingly firm and of a highly vascular type, thus often increasing the difficulties of operative work to a considerable extent. It is also about this time, or a little later, that one

begins to encounter secondary fistulous openings into the intestine and the other complications caused by the tendency of the pus to seek avenues of exit of its own.

* * * * * *

Tracing this sequence of changes from a purely pathological view point, we find three stages of the disease, corresponding in clinical experience to periods showing wide differences in operative mortality. During the first stage we find that when the peritoneal lesion exists at all, they are, as yet, not associated with marked alterations of the peritoneum itself, the lesions being of such a type as to require, if at all, only temporary drainage. After the full development of the peritoneal infection on, as a rule, the second or third day of the attack, and until the diffuse lesion subsides or becomes a localized abscess on about the eighth day, we find the intraperitoneal conditions of such a nature that removal of the appendix is, of itself, by no means curative, at least as regards the peritoneal infection, while this dominating peritoneal infection is essentially of a diffuse character, at best difficult and often impossible to drain efficiently, and but doubtfully benefited by operation. On the other hand, by the eighth or ninth days the peritoneal lesion in the milder cases has already largely disappeared, while in the more severe pus cases the conditions encountered, no matter how great the quantity of pus may be, is essentially an abscess cavity, the drainage of which is simple and a satisfactory surgical procedure.

Stanton found evidences of fresh invasion of peritoneum traceable to the ingestion of food or cathartics by mouth which spread the infection by the peristalsis induced. The starvation plan of treatment tends to make the localization of appendiceal appendicitis possible.

These important observations of Stanton are of peculiar interest to naval medical officers, who encounter cases of appendicitis under most trying environment where the early operations so clearly indicated and comparatively free from mortality can not be performed. Cases can be handled by the modified method of Ochsner and their welfare safeguarded until satisfactory surroundings exist, and possibly more skilled surgical aid is at hand. These late observations resolve themselves very commonly into the drainage of pus cavities. In substance, the modified Ochsner treatment is absolutely nothing by mouth, no large enemata, proctoclysis after the method of Murphy. Where vomiting is present, gastric lavage should be practiced. The head of the cot should be raised 12 inches; morphine is usually not necessary after the first twenty-four hours.

Stanton's mortality under this general plan of treatment was, for 191 cases, 1.57 per cent (3 deaths).—(C. F. S.)

BREWER, GEORGE EMERSON, M. D., and LEGGETT, NOEL B., M. D. **Direct blood transfusion by means of paraffin-coated glass tubes.** Surgery, Gynecology, and Obstetrics, Vol. IX, No. 3, September, 1909.

These authors state:

During the summer of 1908 a series of experiments were undertaken by Doctor Brewer at the surgical research laboratory of the College of Physicians and

Surgeons, by the employment of paraffin-coated glass tubes, to effect union between the artery of the donor and the vein of the donee. A set of glass tubes was made, some of which were straight with a uniform caliber, others bayonet-shaped, and still others somewhat tapering in shape and caliber, to be used where transfusion was attempted from a large adult artery to the small vein of a child. Each extremity of the tube is notched to allow a ligature being applied after the tube is introduced into the lumen of the vessel. These tubes should be sterilized in a steel autoclave, or by boiling, and afterwards dropping in boiling paraffin, and the excess of melted paraffin removed by shaking the tube in the air. This also results in rapid drying of the paraffin, leaving a thin film on both the inner and outer surfaces of the tube. The paraffin adherent to the outer surface of the tube then is removed to allow more ease in handling.

From extensive experiments on dogs it was found that the blood showed little tendency to clot and the technic was materially simplified.

The writers believe that this method is the simplest yet proposed; that it can be carried out by any surgeon of ordinary experience without the necessity of previous training. They also believe that considerable time can be saved by its employment, in that it requires a shorter exposure of the vessels than is necessary to effect union when the methods of direct contact are employed.

The method has been employed to effect transfusion in a patient at the Roosevelt Hospital who was suffering from acute anæmia due to repeated profuse gastric hæmorrhage.

In this instance blood flowed for nineteen minutes through a medium-sized tube without clotting. The patient rallied well. His hæmoglobin rose from 30 to 70 per cent during the progress of the operation, but he died the following day from a recurrence of the hæmatemesis.

The reviewer believes that this simplified technic has a broad field in naval and military surgery. An artery of the upper extremity of the donor should be connected with a vein in the upper extremity of the donee.—(C. F. S.)

BAER, W. S. The use of animal membrane in producing mobility in ankylosed joints. Johns Hopkins Hospital Bulletin, September, 1909.

Baer reviews the work of Murphy's method of using a flap of fascia covered with fat, the use of a muscle flap from an adjoining muscle, used by many surgeons, and Chlumsky's trials with absorbable plates of decalcified bone, ivory, and magnesium; also the use of nonabsorbable materials such as zinc, rubber, silver, etc.

All these methods have been unsatisfactory. The muscle flap is often painful, the fat and fascia make a much too bulky mass to place in a joint, the other materials are irritating, and the joint generally ankyloses after their use.

The membrane finally selected was made from the pig's bladder, which was chronicized so as to last about forty days. This was prepared by Johnson and Johnson.

In all, five cases are reported where the chromicized bladder was used: Case 1, tuberculosis of the hip, gave 35 degrees of flexion after eight months; case 2, synostosis of elbow, gave 110 degrees of motion after three months; case 3, tuberculosis of knee, gave 75 degrees of motion after six months; case 4, tuberculosis of the hip, gave 50 degrees of motion after five months; and case 5, gonorrheal arthritis, gave 35 degrees of motion after forty days. In each case the amount of motion was permanent.

Passive and active motion, together with massage, after the first dressing, not later than the tenth day, and continued daily.—(R. S.)

REPORTS AND LETTERS.

AMERICAN MEDICAL ASSOCIATION.

The following extracts have been made from the report of Surg. Manley F. Gates, U. S. Navy, of the meeting of the American Medical Association held at Atlantic City, N. J., and of its house of delegates, June 7-11, 1909.

The attendance of members was between 3,000 and 4,000, and of the delegates there were present 128 out of the total apportionment of 142.

The retiring president, Doctor Burrell, of Boston, being absent on account of illness, the first vice-president, Doctor Murray, of Butte, presided until the new president, Col. William C. Gorgas, U. S. Army, of the Isthmian Canal Commission, was installed.

On Wednesday evening the reception to the president was so largely attended that it was practicable to present to the president only a part of those present.

At the general meeting on June 8 the president-elect, Doctor Gorgas, was installed in office, but the attendance was so large that his address could not be well heard by most of the audience.

The social features included numbers of college reunions and smokers, also musicales, teas, yachting trips, etc., provided by the local committees.

To the board of trustees were elected Dr. C. E. Cantrell, of Greenville, Tex., to fill a vacancy caused by the death of Dr. T. J. Happel, of Tennessee; Dr. M. L. Harris, of Chicago, to succeed himself; and Dr. C. A. Dougherty, of South Bend, Ind., and Dr. W. T. Councilman, of Boston, Mass, to fill vacancies caused by the expiration of the terms of Doctor Welch and Doctor Porter.

Every State and Territory except Idaho, Nevada, New Mexico, and Utah was represented in the house of delegates, which body, in addition to legislating for the association, elects the officers for the ensuing year.

For 1910-11 the following were elected:

President, Dr. William H. Welch, Baltimore, Md.

First vice-president, Dr. Robert Wilson, Jr., Charleston, S. C.

Second vice-president, Dr. Charles J. Kipp, Newark, N. J.

Third vice-president, Dr. Alexander Lambert, New York, N. Y.

Fourth vice-president, Dr. Stanley P. Black, Pasadena, Cal.

Dr. George H. Simmons and Dr. Frank Billings, of Chicago, Ill., were reelected as general secretary and treasurer, respectively.

The membership of the association May 1, 1909, is reported as 33,935, being an increase during the past year of 2,592, and during the past ten years of nearly 26,000. The membership of the constituent associations totals 67,362.

The house of delegates approved the report of the committee on awards by which gold medals were granted to the society of the Lying-in Hospital, of New York, for its research exhibit, and to the Indianapolis Medical Society for the best tuberculosis exhibit designed especially for popular instruction in the antituberculosis campaign.

Diplomas of honor were awarded for the scientific exhibits of the American Pharmaceutical Association; Dr. Emil Beck, of Chicago; the Jefferson Medical College, of Philadelphia; the laboratory of St. Mary's Hospital, Rochester, Minn.; the Philadelphia Roentgen-Ray Society; University of Maryland; University of Pennsylvania; Polyclinic Hospital, of Philadelphia; Hartford Association for the Prevention of Tuberculosis; and the New York Charity Organization Society. Honorable mention was made of the exhibit of the New York State Department of Health.

The report of the board of trustees was read by its chairman, Dr. William H. Welch, and a few brief extracts are here given:

The past year has been the most successful year in the history of the organization from the financial as well as from the scientific, educational, legislative, and philanthropic view points.

Referring to the councils and committees of the association:

* * * few members of the association realize the great amount of time, energy, and work which the gentlemen who are serving gratuitously on these committees are constantly giving for the improvement and benefit of the profession as a whole and the community at large. The manner in which the committee of to-day *acts* and does things is in marked contrast to the manner in which the committee of a few years ago resolved and did nothing, and it is this spirit or desire to do something for the benefit of all that is one of the most encouraging features of our present organization.

The work of the council on pharmacy and chemistry—

has been done largely gratuitously by men of the highest scientific attainments and imbued with a purely altruistic spirit. The work done by this council has been enormous, and the good results are far-reaching in the highest degree. * * * Some * * * results * * * have been published, * * * but much of it * * * can not find its way into print.

The council is constantly examining a large number of preparations with which the profession is being exploited, and weeding out the frauds and fakes * * *. Many preparations * * * placed on the market * * * by perfectly reputable houses * * * are found either to be below standard or to fall below the claims conscientiously made for them by the manufacturers. On presentation * * * of the results * * * many * * * are modified * * * or taken off the market.

In addition to the great amount of work done by the several members of the council in their respective laboratories, the association * * * has a laboratory of its own * * * under the direct supervision of Professor Puckner.

The excellent work of this council has received general recognition both at home and abroad. It has aroused the medical profession of Germany, which is beginning to take cognizance of conditions which were not realized until this work was commenced. * * *

The work of revision preparatory to publishing the 1909 directory is well under way. * * * The association is endeavoring to supply * * * an official register of the medical profession comparable * * * to the Medical Register of Great Britain.

The Journal * * * has maintained its high standard of excellence. The board of trustees in 1907 authorized the publication of the Archives of Internal Medicine.

The circulation of the Archives is now about 1,800, and the new journal is self-supporting.

The work having far outgrown the capacity of the Journal building, the construction of a new building at a cost of approximately \$200,000 was authorized by the house of delegates.

The association has a total credit balance of \$354,667.82.

The report of the standing committee on medical legislation showed that it had had under consideration during the past year:

- (a) The navy medical reorganization bill.
- (b) Bills relating to the Public Health and Marine-Hospital Service.
- (c) Measures relating to the federal and state regulation of the public health.
- (d) Relief measures for the surviving families of persons who have died in the medical service of the country.
- (e) The uniform regulation of the practice of medicine by the different States.
- (f) Uniform regulation of vital statistics.
- (g) Uniform state laws on food and drugs.
- (h) The attitude of the last administration in appointing a commission for the purpose of reviewing and thus overriding certain findings of the Government agencies lawfully established for the interpretation and enforcement of the national pure food and drugs act.
- (i) The general question of expert medical testimony.

The report of the reference committee on legislation and political action, to which the above-mentioned report was referred, was unanimously approved by the house of delegates and included the following, of especial interest to the government services:

National public health department:

Resolved, That the American Medical Association reaffirms its previously and repeatedly declared attitude in favor of the organization of all existing national public-health agencies into a single national public-health bureau, and that it hails with satisfaction the assurance of President Taft that he will recommend legislation looking to that end.

Amendments to the national food and drugs act:

Resolved, That the American Medical Association respectfully urges upon the Congress the necessity of amending the national food and drugs act in the following particulars, viz:

First. To prohibit absolutely and unqualifiedly the use of benzoate of soda and similar preservatives in the preparation and preservation of food destined for interstate commerce.

Second. To provide for a system of federal inspection of all establishments engaged in the preparation of foods destined for interstate commerce, such inspection having for its special object—

- (a) The enforcement of sanitary cleanliness in such establishments.
- (b) The prevention of employment in them of persons afflicted with contagious or infectious diseases.
- (c) The prohibition of the use of preservatives such as benzoate of soda.
- (d) The prevention of the admission into interstate commerce of unclean and offensive waste products which now, by the use of such preservatives, are branded as foodstuffs and sold as such to the people.

Resolved, That the association respectfully recommends to the United States Congress the enactment of legislation for the improvement of the status of the personnel of the Public Health and Marine-Hospital Service, as set forth in Senate bill 6101 of the Sixtieth Congress.

Navy Department bills:

Resolved, That the American Medical Association cordially approves and urges the prompt enactment into law of measures relating to the Navy Department as follows:

First. The bill "To reorganize and increase the efficiency of the Hospital Corps of the United States Navy." (S. 1017; H. R. 6184, 60th Cong.)

Second. The bill "Authorizing the appointment of dental surgeons in the navy." (S. 1015; H. R. 6741, 60th Cong.)

Third. The bill "A measure to provide for a medical reserve corps of the navy in accordance with the clause relating to that subject in the navy appropriation bill for 1908."

Fourth. A measure to provide for two hospital ships for the navy at a cost not to exceed \$3,000,000.

Conference on uniform state medical practice laws:

Resolved, That the American Medical Association cordially approves the proposition advanced by the committee on medical legislation to call a general conference to be devoted to the discussion of the essentials of a uniform medical practice act of the States, etc.

The effort of the legislative committee to raise funds for the relief of the families of those who have died in the medical service of the country is hereby indorsed, and all members of the American Medical Association are urged to contribute. We approve the action already taken, of the committee on medical legislation, for the relief of Mrs. Carroll.

We recommend the efforts of the committee in the direction of uniform food and drug legislation and urge continuance until all States adopt practically the same laws. We also indorse the efforts of the bureau on medical legislation in the direction of the adoption of uniform state laws on vital statistics.

Reports by the standing committees were also presented as follows:

That on medical education, showing the progress made in improving the required standard of medical education.

On ophthalmia neonatorum, showing a great amount of work done in determining the measures required throughout the United States and the very valuable results obtained by the careful routine use of the silver salts as a prophylactic, and prompt treatment in case infection has occurred.

On organization, showing work done toward the establishment of a national health department, better organization and public instruction in the field of preventive medicine, and the repression of "patent medicines."

On scientific research, reporting grants of \$200 each as follows:

To Dr. Isabel Herb, of Chicago, for a contribution entitled "The etiology of mumps."

To Dr. H. T. Ricketts, of Chicago, for "An investigation of the identity of the Rocky Mountain fever of Idaho with that found in Montana."

To Dr. R. M. Pearce, of New York, for two papers entitled "A study of the elimination of inorganic salts, etc.," and "A comparative study of physical changes in the blood, etc."

To Drs. D. J. McCarthy and M. K. Meyers, of Philadelphia, for "An experimental study of cerebral thrombosis."

To Dr. Carl Voegtlin, for a study by himself and Dr. W. G. MacCallum, "On the relation of the parathyroid to calcium metabolism and the nature of tetany."

An increase of the sum available for grants to \$1,000 was recommended and later approved.

On public instruction on medical subjects, reporting organization and progress in this work, particularly as relates to the infectious diseases. The sum of \$2,000 was appropriated for the use of the board of public instruction.

On nomenclature and classification of diseases, reporting nosological changes recommended. The committee was continued.

On patents and trade-marks, recommending further consideration of the subjects.

On N. S. Davis memorial, an appropriation toward which was later made of \$5,000, contingent on \$20,000 being otherwise raised.

On uniform regulation of membership, showing data collected.

On triennial reapportionment, showing increases in delegates of Illinois, 2; Kentucky, Missouri, Ohio, Pennsylvania, Tennessee, Washington, and West Virginia, 1 each; and a decrease of 1 each for Kansas, Michigan, and North Carolina.

The subcommittee on the Carroll fund reported \$5,700.82 raised, \$1,449.18 being still required to lift the mortgage on the home of the widow of Major Carroll.

The name of the section on surgery and anatomy was changed to "section on surgery," that of the section on cutaneous medicine and surgery to "section on dermatology," and that of hygiene and sanitary science to "section on preventive medicine and public health," and the establishment of a "section on urology and venereal diseases" was authorized whenever 100 members shall petition for the same.

A special committee on anesthesia was appointed and the appropriation of funds for its use was recommended.

Resolutions were introduced and referred:

Recommending restriction of the Red Cross emblem to the uses prescribed by the Geneva Convention.

Recommending the detail of officers of the Public Health and Marine-Hospital Service to present papers on public health subjects to state societies when requested.

Recommending that the privileges of membership in the association be extended to medical employees of the United States Government who, not being engaged in the practice of medicine, are therefore ineligible through the usual channels.

To extend and improve the registration of vital statistics and making it possible for the United States to fulfill its obligations under consular convention with Italy, etc.

An amendment to the by-laws was introduced and referred, providing for the establishment of a council on public health, and defining its functions.

As the matter appeared to be somewhat complex and yet requiring that certain work be undertaken this year, the committee on legislation was authorized to cooperate with a committee from the section on hygiene and carry on necessary work, and the appropriation of funds for its use was recommended. The details of policy and procedure were left to the discretion of the committee on medical legislation.

The proposition to erect in Washington a memorial to the medical officers who gave up their lives during the civil war was approved and central and general committees authorized.

A resolution was unanimously adopted recommending the holding by local medical societies of occasional open meetings to which the

public shall be invited, at which meetings the prevention of disease and the general hygienic welfare of the people shall be discussed.

Also one approving the policy of the Post-Office Department in the issuance of fraud orders against nostrum dealers, etc.

Also indorsing the plan to erect in Washington a "George Washington Memorial Building," as a meeting place for patriotic and scientific societies.

Minor changes in the constitution and by-laws were made, increasing the authority of the trustees over committees in the intervals between sessions of the house of delegates, and changing the method of applying the annual dues and subscription to the journal to comply with the postal regulations.

The report of the council on defense of medical research showed a great amount of work done in investigating the conditions of, and taking precautions against abuse of, animal experimentation, and diffusing information regarding laboratory procedures and results.

The report of the council on defense of medical research showed crease of 200 in the number of medical societies that have taken up these courses.

Among the articles in the commercial exhibit were the following of special interest to medical officers of the navy:

Antitoxin, antirabic vaccine, etc., special syringes for their administration, and vacuum containers for shipment of the virus by mail; microscopical outfits and especially the new reflecting condensers for use under dark-ground illumination in observing spirochete, etc.; pneumatic splints for the ambulatory treatment of fractures; hospital plumbing supplies, and especially a new type of water-closet bowl with raised front, the wooden cover being divided and not continued over the front of the bowl; also a new slop sink with cover for steam sterilization of typhoid excreta; a coil for X ray, cautery, vacuum tube, and faradic use, which seems to be capable of satisfactory service on board vessels of the navy when provided with a rotary converter (this outfit, complete, costs \$225, and appears to merit further examination); all-glass hypodermic syringes and tablet preparations, especially those of argyrol, mercury succinimide, and other metallic salts, those for direct ophthalmic application, of microscopic stains, and of photographic chemicals, also highly-compressed cotton and pleated (instead of rolled) bandages; vacuum cleaning apparatus, pharmaceutical preparations, surgical instruments, electrical apparatus, books, office furniture, and filing systems, underwear, corsets, and automobiles were shown by many firms.

The next meeting of the association will be held in St. Louis, Mo., June 7-10, 1910.

**REPORT ON THE SECOND INTERNATIONAL CONFERENCE FOR REVISION
OF NOMENCLATURE OF DISEASES AND CAUSES OF DEATH, HELD AT
PARIS, JULY 1-3, 1909.**

By Surg. FRANK L. PLEADWELL, U. S. Navy.

Historical outline.—Although it has long been apparent to medical authorities that the adoption of precise language in the naming of diseases represented a necessary preliminary to the attainment of reliable morbidity and mortality statistics, and that lack of uniformity in nomenclature acted to retard medical progress, it is only within recent years that a definite nomenclature of diseases and causes of death has been adopted and made effective in a certain number of the States and cities of the United States. At present, the general registration of deaths in this country is limited to about one-half of the total population, hence the value of statistical reports for comparison with other countries is not as high as it should be. This condition arises partly out of a failure to adopt some proper basis of uniformity in nomenclature and partly from the fact that the Federal Government is powerless to prescribe rules governing this question, as the States, and the cities within the States, are not subject to direction by the Central Government. All agreement upon this subject is, therefore, entirely voluntary. The principal classifications of causes of death in use are: (1) The International, employed by the United States Census Bureau, all of the registration States, and the majority of the registration cities in this country, by all the other countries of North America, by nearly all those of South America, by all of the countries of Australasia, by Japan, by the countries of western Europe (Spain, France, Belgium, Holland, etc.), by some others (Bulgaria, Greece, etc.), and by several cities of Austria and Russia; (2) that of the Register-General of England, which is employed in Great Britain, Ireland, and in all of the British possessions except Canada, Australia, and the Orange River Colony, which use the International; and (3) that of the Imperial Board of Health of Germany.

In this connection it should be stated that a statistical classification of causes of death is quite another matter from a nomenclature of diseases, although it is more or less dependent upon the latter for exact results. A classification is a selected list of the most important terms of a nomenclature; i. e., list of diseases which are ordinarily causes of death. Quite a number of systems of nomenclature of diseases exist, the following being examples:

(1) The nomenclature of diseases drawn up by joint committee appointed by the Royal College of Physicians of London. (Subject to decennial revision.) Fourth edition, being the third revision. London: Darling & Son (Limited), 34-40 Bacon street, E. 1906. Price, 1 shilling.

(2) A nomenclature of diseases and conditions and rules for the recording and filing of histories for Bellevue and allied hospitals. 1903. Revised in 1909. Published in the New York Medical Journal, May 15, 22, 29, and June 5, 1909.

(3) Classification of diseases, Medical Department of the United States Army. (Based on the international classification; expanded to meet army requirements. (See New York Medical Journal, November 29, 1908.)

(4) Statistical report (Form K.) (Contains the nomenclature of diseases for use in the United States Navy.) Revised in 1909.

There is at present no generally accepted standard of nomenclature in this country, but definite action looking to the provision of such a nomenclature has been taken by a committee of the American Medical Association, and it is hoped that such a work will become available during the course of the coming year. Having recognized a practical distinction between a classification of diseases and causes of death and a nomenclature of diseases, a further consideration of the origin and development of the International Classification, with which we are primarily concerned, is appropriate. This classification had its inception in a resolution adopted by the members of the International Statistical Institute at Vienna in 1891. It was resolved by this body "to confide to Dr. Jacques Bertillon the task of preparing a nomenclature of causes of death, to be submitted to the institute at the next meeting." The classification then presented by Doctor Bertillon had been in successful use in the city of Paris for many years. After its presentation to the Statistical Institute it was submitted to a large number of statistical authorities, and after full consideration and examination was finally adopted by that body as a standard nomenclature.

In 1898, at the instance of the American Public Health Association, as well as the International Statistical Institute, and several other scientific societies, suggestions were drawn up looking to the formation of an international commission, which was to assemble and consider the question of the adoption, by the various powers, of a universal classification of causes of death, taking as a basis for this work the Bertillon system above mentioned, the purpose of this movement being to render nosological statistics comparable among different countries of the world. This commission met in 1900, at the call of the French Government. It was participated in by representatives from 26 countries, who duly revised and adopted the International (Bertillon) Classification. In order to keep the classification abreast of progress in medicine it was provided by this commission of revision of 1900 that a revision should be arranged at decennial periods, the French Government being empowered to convene such a commission. In accordance with this requirement, a decennial revision would have fallen due in the year 1910, but at the suggestion of the United States and other countries, in order that the revision

might be available for the census statistics of 1910, its date of assembly was advanced to 1909. Accordingly, on July 1, 1909, the duly accredited delegates from the various powers met at the bureau of the minister of interior, Paris, to take up a consideration of the decennial revision of the International Classification of Diseases and Causes of Death (the Bertillon Classification, so-called) whose origin and development is traced above.

As a large and varied number of recommendations to this commission had emanated from American sources, it was deemed advisable that the American delegation to the commission should be organized into a body to secure concert and unity of action in support of these recommendations. Conformably with this view a meeting of the delegates was arranged at Paris on the evening of June 30. All of the recommendations were then studiously gone over and the more important noted for special treatment.

The first meeting of the international commission was presided over by Professor Landouzy, of Paris, dean of the medical faculty. There were in attendance as official delegates to this commission forty-three representatives of some twenty-three countries. The United States was represented by five delegates, as follows: Dr. Wilmer R. Batt, state registrar of vital statistics of Pennsylvania; Prof. Walter F. Wilcox, of Cornell; Dr. William H. Guilfooy, registrar of records, department of health, city of New York; Dr. H. D. Geddings, surgeon, Public Health and Marine-Hospital Service; Dr. Cressy L. Wilbur, chief statistician, Bureau of the Census; and Dr. Frank L. Pleadwell, surgeon, United States Navy.

The commission of 1900 having empowered Doctor Bertillon to take the necessary measures to facilitate any subsequent revision of the classification, in his capacity as secretary-general, he had, during the year 1908, called for all recommendations from the various countries concerned, and these recommendations, together with such comment as he and his associates desired to make, the mortality rate in Paris of the various diseases represented in the classification and other data bearing on a revision, had been duly collected and assembled in pamphlet form for use by the delegates of revision.

The medical, sanitary, and statistical interests of the United States, through their committees, had been exceedingly prolific in recommendations, and the interest in the revision taken by this country was evidenced not only in this manner, but also by the number of official delegates in attendance from that country, no other country having an equal number of accredited delegates.

Doctor Bertillon, in his remarks at the opening session, referred to the object of the periodical revision of the classification, viz. that it was necessary in order to keep it abreast of scientific advance-

ment in the knowledge of diseases, but placed considerable stress upon the importance of continuity in statistics, and hence the desirability of making no change unless imperatively demanded by a majority of the countries represented.

It may be remarked that this sentiment represented the more conservative element of the commission, and it was this element that was responsible, and justly, for the rejection of the many rather extreme recommendations offered by representatives from various countries. The conference then proceeded to a consideration of the various items of the recommendations for changes, voting upon their adoption by countries, each country having a single vote. This programme was followed without material variation upon the second and third days of the conference, until due consideration had been given to all the recommendations previously submitted.

The conference was presided over upon the second day by Dr. Franz von Juraschek, the Austrian delegate, and upon the third day by Dr. Cressy L. Wilbur, of Washington.

The more important recommendations submitted by the American committees were agreed to by the commission.

At the close of the third session the American delegates duly presented the following specific recommendations for the consideration of the conference:

The delegates on the part of the United States have the honor to submit the following resolutions for the consideration of the international commission now sitting:

1. That an authorized translation of the international nomenclature be made into each language represented at this conference as soon as possible after the close of the session, assisted by the secretary-general. (This was agreed to, and delegates from the countries speaking Spanish, Portuguese, English, etc., were appointed to carry out the provisions of this resolution.)

2. That the secretary-general be solicited to prepare an authorized translation of the nomenclature in Latin. (Agreed to.)

3. That, as far as possible, only definite pathological expressions be employed in the international nomenclature, and that ill-defined titles be indicated by some approved method. (Agreed to.)

4. That the numbers of the titles be employed in all printed reports. (Agreed to.)

5. That the secretary-general be empowered to decide all questions of classification which may arise in the interval between the sessions of the commission, to be assisted, if necessary, by a *referendum* to the national offices employing the same classification. (Definite action deferred.)

6. That the treatment of jointly returned causes of death be submitted to a committee of five, with power, and that this committee make its report through the secretary-general well before the end of the year 1910. (In this connection an official invitation from the secretary-general of the International Congress on Hygiene and Demography, inviting a committee to report at this congress in the section devoted to demography, was presented to the commission.) (Action left with secretary-general.)

The American delegates, in view of the advantages accruing to the United States by the advancement of the date of meeting of the conference from 1910 to 1909, presented the following expression of appreciation:

The French Government having advanced the date of the decennial revision from the year 1910, upon the request of the United States, and by so doing having facilitated the use of the classification in that country, the delegates on the part of the United States have the honor to express their deep appreciation and sincere thanks to the French Government.

The work of the conference having been completed, the ceremony of signing the protocol by the delegates of the countries signifying an adherence to the convention was held in the office of the minister of the interior.

REPORT UPON MEDICAL RELIEF MEASURES AT MESSINA, SICILY.

By Asst. Surg. MARTIN DONELSON, U. S. Navy.

I have the honor to make the following report of the medical work done at Messina, Italy, by the *Celtic*, and of the camp conditions and medical work performed by the naval detachment from the *Scorpion*, in charge of the house-building work at Messina, the latter dating from March 15 to June 11, 1909.

During my absence on leave, the *Celtic* sailed on short notice, and Acting Assistant Surgeon Thompson was assigned as medical officer, I being ordered to join the ship at Gibraltar.

Although Doctor Thompson had authority to take all the medical stores he deemed necessary, he only had about three hours in which to get them aboard from the supply depot in New York. However, with the assistance of the medical officers of the navy-yard and the supply depot, he succeeded in getting aboard quite a large amount of medical supplies, principally surgical dressings and many useful medicines for distribution at Messina.

I joined the *Celtic* at Gibraltar, and she proceeded to Naples and thence to Messina, arriving January 20, 1909.

On reaching Messina some of the stores from the supply depot were given to the Italian hospital ship *Savoy*; many articles for feeding the sick from *Celtic's* supplies were also furnished. The balance of these stores were divided, packed into boxes, and distributed to the various small towns along the coast, together with other provisions from the *Celtic*. The medical stores were invoiced and delivered directly to the medical officers of the Italian army, and their duplicate receipts for all of them are on file aboard the *Celtic*. In every case these stores were needed and the medical officers invariably com-

mended on their excellence, for they had previously received some from the battle ships.

I was relieved from duty on board and put in charge of a small steamer and barges to assist in the distribution of stores to the surrounding towns. Doctor Thompson held sick call, gave medical assistance to all who came aboard, and issued medical supplies to several charitable organizations which were in need of them.

At this time the seriously wounded had all been transferred to towns in Sicily and Italy where there were hospital accommodations; so the medical work consisted of the treatment of the slightly injured who remained, and the sick and casualties among the soldiers, laborers, and natives.

After distributing all provisions the *Celtic* returned to Naples, expecting to sail for New York, but she was ordered to return to Messina about February 20 to assist in establishing a camp for the naval detachment who were to take charge of the house-building work, the *Scorpion* being unable to go to sea.

In anticipation of a two months' stay in Messina some medical supplies were purchased in Naples, and these, together with all that could be spared from the *Celtic*, were taken ashore on March 15 when the camp was established. The expeditionary and boat surgical, venereal, dental, and eye and ear cases were taken ashore, together with an ample supply of medical and surgical appliances in general. I was ordered ashore as medical officer of the detachment; and Doctor Thompson remained on the *Celtic*, which sailed March 15, 1909.

The camp consisted of twelve houses, with a large building in the center containing the galley, pantry, and wash rooms. It was located about 1 mile south of Messina on the site of a former lemon grove on Via San Martino. The personnel consisted of 3 men and 6 officers, besides 15 American carpenters and 6 assistants. The water supply was excellent, being direct from the city mains and obtained 40 miles away in the mountains. The houses were all screened; incinerators for the disposal of garbage were constructed; the waste water was disposed of by underground drains into the "torrente," over which the closets were built, liberally treated with lime and frequently flushed into the sea by the heavy rains from the mountains. We had an underground ice house, insulated with straw, containing 12 tons of ice and many provisions from the *Celtic*. This ice was a great comfort to all, and we were able to supply it to the hospitals for the treatment of sick until they could arrange to obtain it elsewhere.

The medical officers' quarters and office were in one of the houses near the galley, where an abundant supply of hot water was to be had. Owing to the fact that I had but one assistant, Hospital Steward

Thome, and that we had no facilities for keeping patients in camp, the medical work was for the most part necessarily limited to the treatment of such patients as were able to come to camp, although some who could not get assistance elsewhere were attended in their homes. It was impossible to keep close track of the cases or to formulate statistics; their names, disease, and treatment were simply entered in a rough journal for reference.

The dispensary was a busy place from the time the stores were landed until they were packed for return aboard the *Scorpion*, and then only was medical assistance denied. Although no major operations were performed, there was every variety of minor surgery under local anæsthesia. There were numerous wounds of every description—sprains and a few fractures and dislocations among the laborers and the native men, women, and children came in for treatment. There was an abundance of eye work—conjunctivitis, iritis, corneal ulcers, and keratitis were extremely prevalent among the children, undoubtedly a manifestation of hereditary syphilis. Dentistry is almost unknown in Sicily, consequently there were many patients from all classes with dental troubles.

Besides the personnel there were dependent on the camp for medical assistance about 800 Italian laborers employed building the houses, the crews of the steamers which brought the American lumber, the crews of several small British merchant ships, and many engineer officers and laborers who were constructing roads and bridges in the vicinity of our camp.

Toward the last the demand upon the dispensary was greatest, for at this time the 1,200 houses around the camp were well occupied, and among them were many of the wounded who had returned from hospitals, but whose wounds still required dressing.

The patients were all most grateful, and showed their appreciation by their profuse thanks, their offerings of fruits, nuts, etc., and by bringing in their relatives and friends for treatment.

Although the papers gave an account of some new epidemic every few days, there were no epidemics, with the exception of scarlet fever, from which great numbers of children suffered severely. They were poorly clothed, fed, and sheltered, and the nights being extremely cold, they usually had severe complications, and the mortality was very high. A few cases of measles and intestinal disorders occurred. There were always a few cases of typhoid fever and smallpox in the hospitals, but these came in from the country districts, and these affections had always been present there before the earthquake. Influenza appeared in May, but it was not widespread. There are no mosquitoes in Messina, for the land is all cultivated and well drained, hence there is no malaria of local origin; flies and fleas are abundant. Syphilis is very common in the lower classes, and most of the children

show signs of the congenital disease. Trachoma is said to abound, but I recognized only a few cases. Tapeworm (*tænia sagginata*) is almost universal, and is contracted principally by eating raw bologna sausage. Many cases of tuberculosis came in for treatment, and no doubt the mortality is very high, as the people live crowded together in small houses under very bad sanitary and hygienic conditions. Tetanus is said to be very common, but I saw no cases, although several hundred punctured wounds from nails were treated.

The Italian hospital ship *Savoy* left after our camp was established, and there then remained a civil and military hospital and a city dispensary; these were all wooden barracks and very crude for hospital purposes. The American Red Cross built a small hospital, "Regina Helena," at the village of that name; this is beautifully situated on the straits, about 2 miles north of Messina. Although a frame building, it will be plastered and calcimined throughout, and the operating and bath rooms will be fitted with tile. It will be a small hospital when complete, and have accommodations for about 35 patients. It will be by far the best hospital used for surgical cases.

The health of the camp was exceedingly good, the only serious illness being a severe case of catarrhus epidemicus in an officer. There were many cases of cramps, with slight diarrhea and sometimes vomiting. These were always mild and transient and were probably due to bad meat. The ship's meat supply was soon exhausted, and it was impossible to get good meat thereafter.

Venereal prophylactic measures were carried out at both Naples and Messina with very satisfactory results, as these are noted as the worst venereal ports in the world. Although the men were given liberty at both places there was but one case of gonorrhoeal infection. There were several cases of chancroidal and syphilitic infection, due no doubt to carelessness in the use of the preventive measures.

REPORTS OF MEDICAL RELIEF MEASURES AT ADANA, TURKEY.

By Asst. Surg. J. T. Miller, U. S. Navy.—I have the honor to report that in obedience to orders I proceeded on May 17, 1909, to Adana, Turkey in Asia, in charge of the following-named men, on special temporary duty for the purpose of assisting in the care and treatment of the wounded Armenians in that place—W. A. Curtis, hospital apprentice first class; B. Dresner, hospital apprentice first class; T. E. Parrish, hospital apprentice first class; J. W. Head, hospital apprentice. We arrived at Adana at 11 a. m. of the same date and found the following conditions:

A conservative estimate of the number of Armenians killed was about 20,000. As practically all the houses in the Armenian quarter

had been burned, the refugees, numbering 22,000, and fed by the relief committee, were put in camps, very much overcrowded and with only the clothing which they wore. The amount of sickness among these people, especially the children, was enormous, owing to the necessarily coarse food and lack of protection from the heat of the day and the cold of the night. Measles, which had appeared in the city before the massacres, of course spread rapidly among the children, and a so-called "measles camp," isolated from the regular camps, had been formed. The deaths that had resulted from this disease and its complications, especially broncho-pneumonia and intestinal catarrh, were estimated at about 300. Pertussis was also epidemic and added materially to the suffering and death.

Mrs. Doughty-Wiley, the wife of the English consul, a nurse of considerable experience, and the first one with any knowledge of medicine or surgery to reach the place, had established two hospitals, a medical and a surgical. Later, and in addition to these, a third hospital was started in a German factory, and became known as the "German Hospital." The physicians assisting in the care of the sick and the wounded were Dr. H. G. Dorman, of Beirut, sent by the Red Cross Society; Dr. J. Peoples, of the Presbyterian Mission; three Armenian physicians, sent from Constantinople by the Armenian Patriarch; and, of course, the local Armenian physicians. A surgeon from H. M. S. *Minerva*, Doctor Goble, also arrived in Adana on the 17th instant, and Doctor Dorman leaving soon afterwards, the hospital work was divided between the former and myself. Doctor Goble taking charge of the English, or surgical, hospital, and I of the medical, which then became known as the "American Hospital." The writer was also in charge of the measles camp, where he prescribed daily for about 100 children, and in addition had the pleasure of performing and assisting in some of the graver operations at the English Hospital. Doctor Peoples and the Armenian physicians, of whom more arrived from Constantinople, held clinics in various parts of the city and inspected and prescribed for the sick in the general camps. As nearly as can be estimated, they prescribed for about 800 daily.

It was found that no records of the cases in camps or hospitals had been kept, and it is impossible to give any statistics of the work previously done. The surgical hospital contained 60 cases of bayonet and gunshot wounds of practically all parts of the body except the abdomen, all abdominal cases having died. Lack of early and proper treatment had caused all the wounds to suppurate and good results, especially in joint injuries and compound fractures, could not be expected. In addition to these cases from 125 to 150 were coming daily for dressings. In the medical hospital were found 50 cases with no history and no data of any kind, and the question of diag-

nosis an open one. A large number were thought to be typhoid, but with the exception of 3 or 4 rather typical cases, they were found to be malaria. Some of the cases of typhoid and malaria were diagnosed by microscope and Widal reaction, but it is much to be regretted that the large amount of work to be attended to did not permit of much of this kind of study. Besides the cases in hospital there were a large number of outdoor cases to be prescribed for, a clinic being held in the mornings and afternoons. In addition to the hospital apprentices the nursing was done by four young ladies, three Armenian and one French. A summary of the cases follows: Malaria, 30; pneumonia, 7; dysentery, 14; typhoid, 4; acute intestinal catarrh, 16; acute nephritis, 1; chronic nephritis, 1; ascariasis with icterus, 1; abortion, 1; uterine fibroid, 1. There were 7 deaths, several being cases sent to hospital in a moribund condition.

At the time of my departure there were less than 2,000 refugees left in camp, although nearly 10,000 were still being fed by the relief committee, and the measles camp had a few days before been abolished, the sick being taken to the American Mission Girl School. A French hospital has now been started, and a committee of the New Red Moon Society of Constantinople has just arrived and contemplates establishing a Turkish hospital.

It is proposed to convert a building (which has already been secured) 105 feet long by 40 feet wide, and consisting of simply four walls and a roof, into a permanent hospital, to be known as the "American Red Cross Hospital," and the writer, at the request of the president of the relief committee and with the assistance of Doctor Peoples, submitted plans for the same. A sum of \$3,500 is already available.

In closing this report I must speak of the work done by the hospital corps men sent with me. They rendered most valuable assistance in both the medical and surgical hospitals, and those with whom they came in contact spoke of their work in the highest terms. They are to be commended, not only for their earnest, faithful, and intelligent work, but also for their most exemplary deportment.

Owing to the proposed sailing of this ship for Smyrna I was detached from this temporary duty, with my party, and relieved by Asst. Surg. L. W. McGuire, U. S. Navy, on May 30, 1909.

By Asst. Surg. L. W. McGuire, U. S. Navy.—I have the honor to submit the following report of the medical relief party sent from the U. S. S. *Montana* for medical treatment following the Armenian massacres of April, 1909, at Adana, Turkey.

The relief party consisted of myself, one hospital apprentice, first class, and one hospital apprentice, equipped with the medical and surgical field cases, also a quantity of dressings and bandages, extra

medicines, and disinfectants. Rations and distilled water were taken from the ship.

The American Hospital at Adana was then in charge of Asst. Surg. J. T. Miller, U. S. Navy, from the U. S. S. *North Carolina*, whom I relieved May 30, 1909. The hospital, which had been hastily converted from a Greek school at Adana, consisted of nine rooms, one of which was used as a dispensary and the remaining eight as wards, accommodating about 7 patients each. One other small room was used as a kitchen.

Three female graduate nurses from Smyrna were stationed at the hospital, two being Armenian, one acting as interpreter.

Three young men (Armenians), two of whom could speak some English, acted as orderlies.

The beds consisted of a mattress and a blanket placed on the bare floor, but as the native people are used to sleeping in this manner on the roofs of their houses in the summer time, it did not inconvenience them.

All patients coming to the hospital had no underclothing and no extra clothing of any kind, and as no supplies of clothing were on hand, the sick for the most part had to remain in the same clothing which they wore on admission.

Later clothes began to arrive in quantities and were distributed by a committee appointed for that purpose.

Fifty-one cases were in the hospital upon our arrival, all medical, the surgical cases being at the English Hospital, then in charge of an American missionary physician.

Dysentery, malaria, and typhoid fever were the most prevalent diseases. In fact, most of the patients at one time had a severe diarrhea. Most of the deaths were due to dysentery. On microscopical examination of the stools no amœbæ could be found. The dysentery is supposed to have been due to the poor food, exposure, fright, and the poor hygienic surroundings following the massacre, or possibly to some undetermined intestinal infection, but as the dysentery improved with the improvement in diet, it was probably not due to a specific organism.

Three cases were diagnosed as Malta fever on the typical temperature chart and corresponding symptoms.

The number of eye infections and people blind in one or both eyes was very noticeable. Quite a large per cent of the population have trachoma, often complicated with iritis, retinitis, keratitis, pannus, etc., which ultimately lead to blindness.

Most of the patients had a large spleen, some extending as low as the umbilicus. Although the mosquitoes were not very abundant in the city, malaria is exceedingly prevalent in the surrounding country.

The hospital was infested with fleas (*pulex-cheopis*), also flies. As most of the patients would not tolerate a mosquito netting, the exposed parts, as hands and neck, were severely bitten.

Considering the number of homeless people (16,000) who, for most part, were living in the camps under poor hygienic conditions and being fed by the relief committee, it is remarkable that a contagion more serious than measles did not occur, there having been an epidemic of this disease prior to my arrival at Adana.

One operation for inguinal hernia was performed by myself at the English Hospital which was equiped in a similar manner to the American Hospital. As every case in the hospital was infected, it seemed doubtful to prevent infection in this case. All dressings, sponges, and sutures used were brought from the ship. One week after operation there were no signs of any infection and patient had a normal temperature.

Surgical operations at Adana were done under most adverse circumstances; no operating table was to be had except one hastily constructed from boards. The anesthetic was given by the wife of the English consul, sterilization was carried out by means of a kettle on an ordinary cook stove. Morphine, hyoscine, and cactine tablets were used, followed by chloroform, with good results. The use of these tablets for anesthesia seems to be more or less general in Turkey as they are used in Alexandretta and Bierut, probably owing to the difficulty at times of obtaining a good anesthetist.

The Turkish Municipal Hospital consisted of several separate buildings which at the present time are fairly clean, but it was stated that before the massacres the hospital was in a filthy condition.

We were shown no laboratories and in fact few modern hospital equipments. Practically all the patients were Turks, it being extremely difficult to induce Armenians to go there because of a rumor that during the second massacre all sick and wounded Armenians were thrown into the river.

The relief party was withdrawn from Adana June 10, 1909, the American Hospital being left in charge of Doctor Peebles of the American mission, then at the English Hospital. The remaining patients were transferred to the English Hospital a few days after our departure.

The following is a statistical report of the cases treated:

Number of patients on arrival.....	51	
Admitted from May 30 to June 10, 1909.....	28	
		79
Discharged to duty.....	39	
Died (dysentery 5, pneumonia 1, undetermined 2).....	8	
		47
Remaining under treatment June 10, 1909.....		32

CLASSIFICATION OF CASES.

Malarial fever.....	25	Paraplegia	1
Typhoid fever.....	13	Tuberculosis (pulmonary)	1
Trachoma	2	Hepatitis chronica	1
Malta fever.....	3	Contusio	1
Rheumatism (acute).....	2	Cordis valvularum morbus.....	2
Dysentery	19	Undetermined	3
Hernia	1		
Pneumonia	5		<hr/> 79

CLINICAL CASES.

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